RESIDENTS-AS-TEACHERS: NEEDS ASSESSMENT OF RESIDENTS' TEACHING SKILLS IN A CLINICAL SETTING USING DIRECT OBSERVATION OF TEACHING

Olugbenga Edward Ayodele

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Supervisor: Prof Julia Blitz

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DECLARATION

"By submitting this research assignment electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification"

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ABSTRACT

BACKGROUND

Residents teach undergraduate medical students and other health care workers in clinical settings. Despite this pivotal teaching role, the majority of residents have not received formal training in education, and may be adopting ineffective teaching strategies. Some institutions have established residents-as-teachers (RaT) programmes with the aim of improving the teaching competency of residents. However, many of these programmes were put in place without a context-specific needs assessment to identify the existing strengths and deficiencies in the residents' teaching skills. RaT programmes are rare in sub-Saharan Africa, and do not appear to exist in Nigeria. Successful planning and implementation of such a program will involve judicious commitment of scarce human and material resources, which makes a needs assessment imperative.

AIM AND OBJECTIVES

The aim of the study was to do a needs assessment of residents' skills in teaching in the clinical setting. The specific objectives were to determine: residents' self-perceived and true learning needs for facilitating learning in the clinical setting; residents' self-perceived important topics that could be included in a RaT curriculum; and residents' preferred methods of instruction for a RaT programme.

METHODOLOGY

This cross-sectional observational, quantitative inquiry was conducted at Ladoke Akintola University of Technology (LTH), Ogbomoso, Nigeria. Thirty nine (78%) out of a total population of 50 residents voluntarily agreed to participate in the study. The 39 residents were subsequently divided into two groups on the basis of their willingness to have their clinical teaching sessions observed – those who were willing to be observed (Group A, n=20) and those not willing to be observed (Group B, n=19). Sixty two (85%) out of a total population of 73 medical students in Years 5 and 6 rotating through Internal Medicine, Surgery, Paediatrics and Obstetrics & Gynaecology at the hospital agreed to participate in the study.

The study instruments consisted of a self-administered questionnaire completed by all residents, and the 24-item, 7-domain Maastricht Clinical Teaching Questionnaire (MCTQ) [rated on a 5-point Likert scale] completed by the residents, the medical students (recipients of the clinical teaching), and the researcher (who acted as an unobtrusive observer) after the teaching sessions. The residents' self-perceived learning needs were determined by the teaching actions the fewest residents agreed or strongly agreed that they used during the course of their teaching. The residents' true learning needs from the students' and researcher's perspective were the teaching actions least experienced by the

students, and the teaching actions least observed by the researcher respectively during the course of teaching.

Discrete data were summarized as percentages, and quantitative data as means (standard deviation [SD]). Differences in discrete and continuous variables were analysed using chi square and student's t test respectively. All p values ≤ 0.05 were considered to be statistically significant.

RESULTS

Most residents had never had formal training in teaching, the vast majority indicated that skill development in teaching is very important, and all expressed the desire to be trained in developing their teaching skills.

The residents' self-perceived learning needs based on a self-administered questionnaire were formulation of learning goals ('*exploration*'), and guidance given to students to bolster students' independence (domain of '*scaffolding*'). The residents' true learning needs based on MCTQ items least observed were demonstration of different tasks ('*modelling'*), providing guidance and feedback ('*coaching'*), encouraging students to think through their performance, voicing out their strengths and weaknesses ('*reflection'*), and formulation of learning goals ('*exploration'*). The leading topics perceived by residents to be important for a RaT course were communication skills, leadership, teaching of procedural skills, and bedside teaching; and their preferred methods of instruction were interactive sessions with teachers, and working in small groups with a facilitator.

CONCLUSION

Findings from this study therefore provide important baseline information on the strengths and weaknesses of our residents in facilitating learning in the clinical setting. This needs assessment of residents' teaching skills will serve to inform the design of a tailor-made RaT course for LAUTECH residents.

OPSOMMING

AGTERGROND

Kliniese assistente onderrig voorgraadse mediese student en ander gesondheidsorgwerkers in kliniese instellings. Ondanks hierdie belangrike rol in die onderwys, het die meerderheid kliniese assistente nog nie formele opleiding in die onderwys ontvang nie en neem hulle moontlik ondoeltreffende onderrigstrategieë aan. Sommige instellings het kliniese assistente-as-onderwysers (RaT)-programme opgerig met die doel om die onderrigvaardigheid van die kliniese assistente te verbeter. Verskeie programme is egter sonder konteks-spesifieke behoeftebepaling in werking gestel wat sterkpunte en swakpunte in kliniese assistente se onderrigvaardighede identifiseer. RaT-programme is skaars in Sub-Sahara Afrika en nog nie opgeteken in Nigerië nie. Suksesvolle beplanning en implementering van die program behels ‘n oordeelkundige toewyding van menslike en materiële hulpbronne wat skaars is en dus noukeurige behoeftebepaling noodsaaklik maak.

DOEL EN DOELSTELLINGS

Die doel van die studie was om 'n behoeftebepaling te doen van kliniese assistente se vaardighede in die kliniese omgewing. Die spesifieke doelstellings was om die volgende te bepaal: kliniese assistente se self-waargenome en ware leerbehoeftes om leer in die kliniese omgewing te vergemaklik; kliniese assistente se self-waargenome belangrike onderwerpe wat in 'n RaT-kurrikulum opgeneem kan word; en klinese assistente se voorkeurmetodes vir onderrig vir 'n RaT-program.

METODE

Hierdie waarnemende kwantitatiewe dwarssnitstudie is by Ladoke Akintola Universiteit van Tegnologie (LTH) in Ogbomoso, Nigerië gedoen. Nege-en-dertig (78%) van die totale bevolking van 50 kliniese assistente het vrywillig ingestem om aan die studie deel te neem. Die 39 kliniese assistente is in twee groepe verdeel op grond van hul bereidwilligheid om hul kliniese opleidingsessies waar te neem – diegene wat bereid was om waargeneem te word (Groep A, n = 20) en diegene wat nie bereid was om waargeneem te word nie (Groep B, n = 19). Twee-en-sestig (85%) uit die totale bevolking van 73 mediese studente in hul vyfde en sesde jaar wat deur Interne Geneeskunde, Chirurgie, Pediatrie en Verloskunde en Ginekologie in die hospital geroteer het, het ingestem om aan die studie deel te neem.

Die studieinstrumente het bestaan uit 'n self-geadministreerde vraelys wat deur alle inwoners voltooi is, en die 24-item, 7-domein Maastricht Kliniese Onderwys Vraelys (MCTQ) [beoordeel op 'n 5-punt Likert-skaal], voltooi deur die kliniese assistente, die mediese studente (ontvangers van die kliniese onderrig), en die navorser (wat as 'n onopvallende waarnemer opgetree het) na die lesingsessies. Die kliniese assistente se self-waargenome leerbehoeftes is bepaal deur die onderrigaksies waaroor die

minste kliniese assistente saamgestem het of die meeste saamgestem het dat hulle dit gebruik in hul onderrig. Die kliniese assistente se ware leerbehoeftes vanuit die perspektief van studente en navorsers was die onderrigaksies wat die studente die minste ondervind het, en die onderrigaksies wat die navorser onderskeidelik tydens die onderrigperiode waargeneem het.

Diskrete data is opgesom as persentasies, en kwantitatiewe data as gemiddelde (standaardafwyking [SD]). Verskille in diskrete en kontinue veranderlikes is geanaliseer met die chi-kwadraattoets en die student se t-toets onderskeidelik. Al die p-waardes ≤ 0.05 is as statisties betekenisvol beskou.

RESULTATE

Meeste kliniese assistente het geen formele opleiding in onderrig gehad nie en die oorgrote meerderheid het aangedui dat vaardigheidsontwikkeling in onderrig baie belangrik is, en almal het die behoefte betuig om opgelei te word om sodoende hul onderrigvaardighede te ontwikkel.

Die kliniese assistente se self-waargenome leerbehoeftes gebaseer op ‘n self-geadministreerde vraelys, was die formulering van leerdoelwitte (‘verkenning’), en leiding wat aan student gegee is om hul onafhanklkheid te versterk (domein van ‘steierwerk’). Die kliniese assistente se ware leerbehoeftes gebaseer op MCTQ-items wat die minste waargeneem is, was die demonstrasie van verskillende take (‘modellering’), leiding en terugvoering (‘afrigting’), aanmoediging van student om na te dink oor hul prestasies, hul sterk- en swakpunte uit te spreek (‘besinning’) en formulering van leerdoelwitte (‘verkenning’). Die onderwerpe wat kliniese assistente as belangrik beskou het vir ‘n RaT-kursus, was kommunikasievaardighede, leierskap, onderrig van prosedurele vaardighede en praktiese onderrig; en hul voorkeurmetodes van onderrig was interaktiewe sessies met onderwysers, en om te werk in klein groepe met ‘n fasiliteerder.

GEVOLGTREKKING

Bevindinge van hierdie studie bied dus belangrike basislyn vir inligting oor die sterk- en swakpunte van kliniese assistente om leer in kliniese omgewings te vergemaklik. Hierdie behoeftebepaling van kliniese assistente se onderrigvaardighede sal bydra tot die ontwerp van ‘n pasgemaakte RaT-kursus vir LAUTECH-kliniese assistente.

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ACGME – Accreditation Council for Graduate Medical Education

AL – Analysis of literature

Anaes. – Anaesthesia

AP – Attending physician

Cardio. – Cardiology

CCTEI – Cleveland Clinic's Clinical Teaching Effectiveness Instrument

Comm. Med. – Community Medicine

CoP – Community of practice

CTAF – Clinical Teaching Assessment Form

CTEI – Clinical Teaching Effectiveness Instrument

CTORS – Clinical Teaching Observational Rating Scale

EFFECT – Evaluation and Feedback for Effective Clinical Teaching

ENT – Ear, Nose and Throat

EO – Expert opinion

ERS – Emergency Rotation Scale

Fac – Faculty

Fam. Med – Family Medicine

GAS – Global Assessment Scale

GP – General Practice

GRS – Global rating Scale

Haem. – Haematology

HREC – Health Research Ethics Committee

Infect. Dis. – Infectious Disease

Int. Med – Internal Medicine

LAUTECH - Ladoke Akintola University of Technology

LTH – Ladoke Akintola University of Technology Teaching Hospital

MB;BS – Bachelor of Medicine, Bachelor of Surgery

MCTQ – Maastricht Clinical Teaching Questionnaire,

MedIQ – Medical Instructional Quality

MS – Medical students

NCS – Not clearly stated

Neu. – Neurology

NI – Not indicated

NP – Not provided

NS – Not specified

O&G – Obstetrics & Gynaecology

Obs – Observation

Oncol. – Oncology

Oph. – Ophthalmology

Orthop. – Orthopaedics

OSTE – Objective Structured Teaching Evaluations

OTE – Overall Teaching Effectiveness,

Paed. – Paediatrics

Path. – Pathology

PEQ – Preceptor Evaluation Questionnaire

Pharm. Stud – Pharmacy students

PI – Principal Investigator

Psy. – Psychiatry

Pulm. – Pulmonary Medicine

PVI – Previously validated instrument,

Radio. – Radiology

RaT – Residents-as-teachers

Res – Residents

Resp. – Respiratory Medicine

SD – standard deviation

SETOC – Student Evaluation of Teaching in Outpatient Clinics

SETQ – System for Evaluation of Teaching Qualities

SFDP – Stanford Faculty Development Program

SR – Senior residents

Surg. – Surgery

TES – Teaching Effectiveness Scores

WATCH – Warwick Assessment Instrument for Clinical Teaching

WICT – Wisconsin Inventory of Clinic Teaching

CHAPTER 1: INTRODUCTION

Background of the study

Residents (also referred to as registrars in some countries) are postgraduate doctors enrolled in a training programme to qualify as consultants or specialists. Most of the learning experiences of residents occur in work-based settings as they perform their professional duties as physicians attending to patient care. Depending on their level of training, residents teach junior peers and undergraduate medical students and can appropriately be referred to as near-peer teachers (Ramani et al., 2016; Ross & Cameron, 2007). They also teach other health care professionals, patients, family members, and members of the public during the course of their training (Ramani et al., 2016). Thus, residents fulfill the roles of professionals, learners, and teachers (Busari & Scherpbier, 2004).

On completion of the training programme, residents become consultants and are appointable as lecturers at universities by virtue of their content expertise despite little or no formal training in teaching during the training period. Although consultants are primarily responsible for teaching undergraduate medical students, the competing demands for provision of clinical services, research and administration have reduced consultants' contact time with medical students in many clinical settings (Bordley & Litzelman, 2000; Kaji & Moorhead, 2002). This has led medical students to spend increasingly significant time with residents during the course of their training. Studies have shown that an estimated 20 – 60% of the clinical teaching sessions during undergraduate medical training were by residents (Cullimore et al., 2010). It is estimated that residents spend 20 – 40% of their time teaching medical students (du Toit-Prinsloo et al., 2016; Hill et al., 2009; Post et al., 2009; Smit 2014; Whittaker et al., 2006). It is also estimated that up to 30% of medical students' knowledge is directly attributed to the teachings done by residents (Morrison et al., 2002; Post et al., 2009).

Residents teach undergraduate medical students in clinical settings such as outpatient clinics, inpatient services, emergency units, theatres, and communities. They teach history taking, physical examination techniques, procedures, and clinical reasoning. These teachings are learning interactions between residents and undergraduate medical students and they are mutually beneficial to both parties. Residents who teach have an enhanced motivation to engage with and learn the subject material or topics. This leads to better organization of information and deep learning when compared with lecture attendance or self-study (Weiss & Needlman, 1998). Teaching also enhances the self-monitoring and self-reflection of residents (Busari et al., 2002), in addition to improvement in their clinical skills and job satisfaction (Al

Achkar et al., 2017, Bing-You & Harvey, 1991; de Villiers et al., 2014; Morrison et al., 2005, Post et al., 2009; Ramani et al., 2016). The senior residents in some settings also have opportunities to lead rounds and other clinical activities that help the development of their leadership and time management skills (Ramani et al., 2016).

Medical students also benefit from their interaction with residents. The communication skills, clinical reasoning and problem-solving abilities of students are improved with these interactions (Bordage & Lemieux, 1991). The closeness in age and professional development of undergraduate medical students to residents help in promoting informal and empathic communication during their interactions. This creates a non-threatening positive learning environment which allows students to ask questions, admit deficiencies and to willingly receive constructive feedback (Rodrigues et al., 2009; Ross & Cameron 2007; Tolsgaard et al., 2007). Also, medical students learn professional attitudes, ethics and role-modelling which represent the informal or hidden curriculum of medical training from their interactions with residents (Bordley & Litzelman, 2000; Ramani et al., 2016). Furthermore, residents who teach effectively have significant influence on the future career choices of the medical students (Musunuru et al., 2007; Whittaker et al., 2006).

Despite these important roles of residents in undergraduate clinical teaching, the majority of residents have not received formal training in education or teaching skills (du Toit-Prinsloo et al., 2016; Hill et al., 2009; Post et al., 2009; Smit 2014; Whittaker et al., 2006). Residents thus based their teaching on their experiences as students or residents (Bing-You & Tooker, 1993; Gibson & Campbell, 2000). In the absence of formal training in teaching, residents may be adopting ineffective teaching strategies (Morrison & Hafler, 2000).

The recognition of the importance of teaching by residents has made many international regulatory and licensing bodies to include teaching and supervision of peers and students as essential competency requirements for junior doctors (Academy of Medical Educators 2014; Accreditation Council for Graduate Medical Education 2014; Liaison Committee on Medical Education 2015; Ramani, et al., 2016). This has led to the establishment of residents-as-teachers (RaT) programmes in some institutions with the aim of improving the teaching competency of residents (Morrison et al., 2005; Ramani et al., 2016; Smit 2014). However, RaT programmes are not common in sub-Saharan Africa, and based on a search of medical literature do not appear to exist in Nigeria.

Evaluations of RaT programmes have shown improvement of self-and objective-assessments of the residents' teaching ability (de Villiers et al., 2014; Ramani et al., 2016). The evaluations also show a better comprehension of the principles of learning and teaching, a renewing of enthusiasm to engage in teaching, an adoption of student-centred learning techniques, and an improvement in the ability to offer constructive feedback (Morrison & Hafler, 2000).

RaT programmes vary substantially in content, duration and format across institutions (Wamsley et al., 2004). Many of the RaT programmes were put in place without a prior context-specific needs assessments being done to identify the existing strengths and deficiencies in the residents' teaching skills (Jarvis-Selinger et al., 2011; Wamsley et al, 2004). Needs are any 'gap' between what is, and what should be (Davis et al, 2008). Learning needs can be classified as either perceived learning needs or true learning needs (McKimm & Swanwick 2009; Thampy, 2013). Perceived learning needs are needs that the learner is aware of and tend to be subjective, while true learning needs are determined by an objective assessment of the performance of the learner against some predetermined standard or expectation (McKimm & Swanwick 2009; Thampy, 2013).

A needs assessment is central to the successful planning and implementation of an educational intervention (D'Silva et al., 2016; Grant, 2002; Harden, 1986; Katz et al., 2003; Kern et al., 1998; McCawley, 2009; Ramani et al., 2016; Sanchez-Mendiola et al., 2010). A needs assessment also provides the opportunity to identify performance gaps or deficiencies in practices that require improvement, to ensure that educational interventions are relevant to needs, and to provide baseline data that can be used to evaluate the impact of an educational intervention (Davis et al., 2006; Davis et al., 2008; Harden, 1986; Kern et al., 1998).

Motivation for the study

There is no RaT programme in my setting at the Ladoke Akintola University of Technology Teaching Hospital (LTH), Nigeria. Successful planning and implementation of such a programme will involve judicious commitment of scarce human and material resources, which makes a needs assessment imperative. A needs assessment will help to identify critically important gaps in the clinical teaching skills of our residents which can then be addressed by developing performance-based RaT curricular objectives. It will afford us the opportunity of determining baseline performance data against which the impact of the programme can be evaluated. Finally, it will help in defining the scope of the content of the RaT curriculum, and the most effective ways of engaging our residents in the RaT programme if it were to be formally instituted.

Research Question /Aims and Objectives

Research Question

The research questions for the study is 'What are the self-perceived and true learning needs of residents involved in undergraduate medical training with regards to clinical teaching and learning?

Aim and Objectives

The aim of this study is to do a needs assessment of residents' teaching skills in order to determine the strengths and weaknesses of the teaching skills of the residents involved in clinical teaching, so that a RaT course can be designed to incorporate these.

Specific Objectives

1. To determine the residents' self-perceived learning needs for facilitating teaching and learning in the clinical setting.
2. To determine the residents' true learning needs for facilitating teaching and learning in the clinical setting by direct observation of residents' teaching of undergraduate medical students.
3. To determine the residents' self-perceived important topics to be included in a RaT curriculum.
4. To determine the residents' preferred methods of instruction for a RaT programme.

CHAPTER 2: LITERATURE REVIEW

The transformation of undergraduate medical students into competent healthcare professionals fit for medical practice involves the acquisition of requisite clinical knowledge and skills, the development of positive professional attitudes, and the cultivation of self-directed, lifelong learning habits (Kantak & Winstein, 2012). This '*journey of becoming'* involves teaching by consultants (who are primarily employed to train them), and residents who are themselves postgraduate students aspiring to become consultants (Cullimore et al., 2010; Morrison et al., 2002; Post et al., 2009).

Teaching has traditionally been an integral part of being a medical doctor. In fact, the word 'doctor' has its root in the Latin word *'docere'* meaning to teach (Shappiro 2001). This has led to the assumption that all doctors can teach (Halestrup and Leeder, 2011). However, it is becoming increasingly clear that teaching is a profession with unique theoretical backgrounds and proven techniques (Ramani & Leinster, 2008). Thus, effective teaching not only depends on the sound knowledge of the subject matter and a desire to teach but also on the ability to acquire and apply sound teaching theories and techniques in diverse settings (Ramani & Leinster, 2008).

Spectrum of Teaching by Residents

Residents are involved in the formal and informal training of undergraduate medical students. During the course of their daily clinical activities at inpatient, outpatient, and community settings, residents supervise and teach medical students during their clinical clerkship in different departments (Bordley & Litzelman, 2000; Kaji & Moorhead, 2002). These settings, which constitute the clinical learning environment, present their own unique opportunities and challenges to teaching. Residents may observe medical students when they take history from patients and perform physical examination on them. Medical students may present patients to residents on work rounds and may be provided with feedback on these presentations. Also, medical students have the opportunity to observe, and may sometimes assist residents during the performance of procedures. In a few instances, the students are allowed to perform simple procedures (such as venepuncture, urinary bladder catheterization) under supervision. Furthermore, students may learn clinical reasoning, the selection of appropriate diagnostic tests, the interpretation of diagnostic tests, and selection of appropriate treatment during the residents' presentation and discussion of patients with consultants (Bordley & Litzelman, 2000).

Medical students also tacitly learn the informal curriculum of attitude, work ethics and role modelling as they observe residents during their interactions with patients, their care givers and other health care workers. Residents, depending on their level, lead ward rounds and other clinical activities and students have the opportunity to observe and learn leadership skills, time management, role modelling and team work (Bordley & Litzelman, 2000).

Rationale for Residents-as-Teachers Programme

Similar to what obtains in many other countries, consultants who are primarily employed to teach medical students are frequently engaged in other important activities such as clinical service delivery, research and administration (Bordley & Litzelman, 2000, Parry et al., 2008). The pressure to win research grants (and by doing so lend financial support to the institution), the high premium on publications for career promotion, and administrative activities have significantly reduced the time dedicated to teaching by consultants. This in turn has led to an increase in contact time between residents and medical students (Parry et al., 2008; Ramani et al., 2016). Residents spend an estimated 20 – 40% of their time teaching undergraduate medical students and approximately one third of the students' knowledge derives from their interactions with the residents (Morrison et al., 2002; Post et al., 2009).

Despite this pivotal role of residents in undergraduate training, many of them have little or no formal training in teaching and may adopt ineffective teaching strategies (Morrison & Hafler, 2000). A review of the literature shows that 60 – 70% of residents never had formal instruction in teaching before the establishment of RaT programmes in their institutions (D'Silva et al., 2016; Halestrap & Leeder, 2011; Thampy et al., 2014). The recognition of the vital role of residents in training of medical students led many regulatory professional and licensing bodies to include teaching and supervision of medical students and peers as an essential competency for junior doctors (Academy of Medical Educators 2014; Accreditation Council for Graduate Medical Education 2014; Liaison Committee on Medical Education 2015; Ramani et al., 2016).

In order to address the residents' possible deficiencies in formal training for teaching, and in compliance with directives by these regulatory bodies, some institutions established residents-as-teachers (RaT) programmes (Busari et al., 2000; Thampy, 2013). A survey of residency programmes in United States of America by Morrison et al. (2001) revealed that only 55% of the programmes had formal RaT programmes. A more recent survey of all programme directors listed in the directory of the Accreditation Council for Graduate Medical Education (ACGME) showed that 80.54% reported providing RaT instruction, representing an increase of 26.34%

from the 2001 survey (Al Achkar et al., 2017). RaT programmes are very rare in sub-Saharan Africa (Smit, 2014) and based on search of medical literature do not appear to exist in Nigeria.

Residents' effectiveness as teachers can be attributed to the existence of *social congruence* and *cognitive congruence* between residents and medical students (Bené & Bergus 2014; Lockspeiser et al., 2008; Yew & Young 2014). Social congruence refers to the ability of the residents to freely communicate and empathise with the medical students. This helps in creating a supportive and non-threatening environment that encourages the free flow of information and ideas (Schmidt & Moust 1995). Cognitive congruence describes the similarity in the knowledge base or cognitive schema of the residents and the medical students which enables the residents to ascertain the medical students' prior knowledge and to communicate and explain concepts in ways that can be easily understood by the medical students (Lockspeiser et al., 2008; Turner et al., 2014; Yew & Young, 2014)

Curricular content, format, structure and teaching strategies of Residents-as-Teachers Programmes

There is a substantial variation in the curricular content, format, structure and teaching strategies employed in RaT programmes in various institutions. The content includes topics such as leadership, adult learning theories, setting of learning goals, small group teaching, large group teaching, bedside teaching, and the use of clinical teaching models such as One Minute Preceptor, or SNAPPS. Other programmes include learning theories, learning styles, feedback, the teaching of procedural skills, communication skills, learning climate, curriculum design, assessment practices, self-directed learning, and the delivery of lectures (Hill et al., 2009; Lacasse & Ratnapalan, 2009; Post et al., 2009).

The variable format of RaT programmes includes a one-off few hours in a day, one to two days intensive workshop, and longitudinal courses running over weeks to months (Hill et al., 2009; Lacasse & Ratnapalan, 2009; Post et al., 2009). The courses are integrated into the residents' daily schedule in some settings while in others, the programme takes place outside the hospital setting to prevent interference that may arise from engagement in clinical duties. Multiple teaching strategies have been employed in RaT programmes. These include interactive discussions, lectures, case vignettes, role play, simulation teaching, one-on-one mentoring and online interactions.

The impact of Residents-as-Teachers Programmes

The medical education literature is replete with articles on the impact of RaT programmes (Hill et al., 2009; Lacasse & Ratnapalan, 2009; Post et al., 2009). Tools used in the assessment of RaT programmes include:

(1) the residents' self-assessment of teaching ability and enthusiasm (Gaba et al., 2007; Litzelman et al., 1994, Litzelman et al, 1998a; Morrison & Hafler, 2000, Spikard et al., 1996),

(2) the assessment of residents' teachings by undergraduate medical students, peers and faculty members (Busari et al., 2006; Furney et al., 2001; Hammoud et al., 2004; Pelletìer & Belliveau, 1999; Ricciotti et al., 2012; Snydman et al., 2013; Spikard et al., 1996),

(3) indirect observation using video recording of teaching interactions (Barth et al., 1997; D'Eon, 2004; Roberts et al., 1994), and

(4) direct observation of teaching encounters and the evaluation of teaching using objective structured teaching evaluations (OSTE) (Gaba et al., 2007; Katz et al., 2003; Zabar et al., 2004; Zackoff et al., 2015).

The study designs to evaluate RaT programmes also vary and include cross-sectional studies (Katz et al., 2003; Owolabi et al., 2014), pre- and post-intervention cohort studies (D'Silva et al., 2016; Frattarelli & Kasuya, 2003; Litzelman et al., 1994; Litzelman et al, 1998a, Wachtel et al., 2013), non-randomized trials (Busari et al., 2006; Gaba et al., 2007; Hammoud et al., 2004; Spikard et al., 1996), and randomized controlled trials (D'Eon, 2004; Dunnington & Da Rosa, 1998; Edwards et al., 1988; Furney et al., 2001; Morrison et al., 2004)

These studies have shown that RaT programmes have many benefits, which include an improvement of the residents' self-assessment of their teaching ability, confidence and enthusiasm to teach, as well as an improvement of critical self-reflection and clinical skills (Morrison & Hafler, 2000; Morrison et al., 2005; Wachtel et al., 2013; de Villiers et al., 2014). Using OSTE, Morrison et al. (2004) showed that the teaching behaviour of residents improved following a RaT programme.

Teaching also results in the residents improving their retention and retrieval of knowledge. This is because the act of preparing for teaching helps the residents to organize information,

reflect on the subject material, and connect new information with prior knowledge. Teaching therefore promotes deep learning (Bené & Bergus, 2014; Gregory et al., 2011).

However, a review of the literature has not shown consistent correlation between residents' academic performance and residents' teaching activities (Ramani et al., 2016). Also, RaT programme may help the residents acquire soft skills such as time management and leadership skills (Vu et al., 1997; Wipf et al., 1999). Lastly, RaT programmes have the potential of encouraging residents to take on positions as lecturers after the conclusion of their residency programme although this has not been conclusively shown by studies (Ramani et al., 2016). The success of the various RaT programmes varies and this is probably a reflection of the content, design, and format of the curriculum, the duration of the programme, and the robustness of a needs assessment (if any) done before commencement of the programme. Literature also revealed that many of the RaT programmes were put in place without a context-specific needs assessment to identify the strengths and deficiencies in the residents' teaching skills (Jarvis-Selinger et al., 2011; Wamsley et al., 2004).

The importance of Needs Assessment in Planning Educational Interventions

A needs assessment is a systematic process of collecting information about an organizational need (Ratnapalan & Hilliard, 2002). It is a three-phase process involving: (1) data collection – information is gathered to make appropriate decision; (2) analysis – the information is analysed, interpreted and inferences or conclusions made; and (3) creation of an intervention (training) plan to resolve or address the performance deficiency (Ratnapalan & Hilliard, 2002). A needs assessment is central to the successful planning and implementation of an educational intervention (D'Silva et al., 2016; Grant 2002; Harden 1986; Katz et al., 2003; Kern et al, 1998; McCawley 2009; Ramani et al, 2016; Sanchez-Mendiola et al, 2010).

A needs assessment provides the opportunity to identify performance gaps or deficiencies in practices which can then be addressed by developing performance-based objectives that require improvement. A needs assessment can identify the strengths that can be built on; it ensures that the educational interventions are relevant to residents' needs; and it provides baseline data that can be used to evaluate the impact of an educational intervention (Davis et al., 2006, Davis et al., 2008). The methods used in a needs assessment include questionnaires, self- assessment, focus groups, structured interviews, critical incident techniques, gap or discrepancy analysis, peer reviews, observation of performances, and audio and video assessment of performances (Davis et al., 2008).

Learning Needs and Self-Assessment

Learning needs can be classified as *perceived* or *true* learning needs (McKimm & Swanwick 2009; Thampy, 2013). Perceived learning needs are needs that the learner is aware of, while true needs are those that the learner may be unaware of and can be determined by observation of the learner's performance against a predetermined expectation or standard.

Perceived learning needs can be determined by self-assessment of the learner's current ability (McKimm & Swanwick 2009; Thampy, 2013). Self-assessment helps in identifying an individual's weaknesses and strengths (Eva & Regehr, 2005). The identification of weaknesses have important implications. First, it allows the individual to act within the confines of his/her competence. Second, it allows the individual to set appropriate learning goals in order to improve his/her competence or performance (Eva & Regehr, 2005). Third, it allows the individual to set realistic expectations of himself/herself. In the same vein, identifying strengths also have important implications. First, it gives the individual the impetus to act confidently when engaged in a task. Second, it gives the individual the confidence to persevere regardless of the difficulties encountered during a task. Third, it allows the individual to set higher goals (Eva & Regehr, 2005).

Studies on the accuracy of self-assessment as measures of competence have yielded mixed results (Davis et al., 2006; Colthart et al. 2008). Many studies have documented poor correlation between self-assessment and objective assessment of performance such as direct observation. This casts doubt on the usefulness of self-assessment in the identification of learning needs (Davis et al., 2006; Colthart et al., 2008). Other researchers however, have pointed out that many studies on self-assessment are fraught with methodological flaws. However, self-assessment is still useful in assessing competence and learning needs (Eva & Regehr, 2005; Ward et al., 2002). Eva & Regehr (2005, pS43) argue that self-assessment should be seen as a 'multifaceted, multipurpose phenomenon that varies by content, context and perspective'. There is also evidence that self-assessment skills can be enhanced by feedback, and by making the assessment criteria explicit (Colthart et al., 2008). It has also been suggested that combining self-assessment with student ratings can help provide useful feedback to clinical teachers provided the aim of self-assessment is to stimulate workplace learning by identifying standards of excellence, deficits and suggestions for improvement (Ross & Bruce, 2007; Stalmeijer et al., 2010).

It has been argued by some scholars that human beings cannot produce an accurate assessment of their own performance and ability, as such, other complementary methods of assessment such as direct and indirect observations should be utilized (Eva & Regehr, 2008). In view of this, determination of a learner's true learning needs should involve an objective assessment of the learner's performance using validated instruments, tools or standards (Thampy 2013). Thus, assessment of learning needs should involve triangulation of information from multiple sources, using multiple strategies in order to have a comprehensive view of the learners' weaknesses and strengths (Gay, 1996; Lockyer, 1998).

Instruments used in assessing teaching in clinical settings

A number of instruments have been developed in quantitative studies to assess teaching in the clinical settings (see Table 2.1). These instruments vary in their general characteristics such as the institution(s) and the country of origin of the instruments, the clinical setting(s) that the instrument was developed for (inpatient, ambulatory, combined inpatient and ambulatory, emergency department, theatre), the clinical discipline(s), the number of clinical teachers involved, the number of evaluators, the number of evaluations, and the type of evaluators (residents, medical students, faculty) involved in the development of the instrument.

As shown in Table 2.1, most of the instruments were developed in the United States of America (Afonso et al., 2005; Beckman et al., 2003; Copeland & Hewson, 2000; Cox & Swanson, 2002; James & Osborne, 1999; Litzelman et al., 1999; Silber et al., 2006, Smith et al., 2004; Tortolani et al., 1991; Williams et al., 2001, 2002), Europe (Dolmans et al., 2004; Donner-Benzhoff et al., 2003; Haider et al., 2015; Stalmeijer et al., 2008, 2010); and North America (Cohen et al., 1996; Guyatt et al., 1993; Nation et al., 2011; Steiner et al., 2000). However, two of these instruments were developed in Brazil (de Oliveira et al., 2008) and Pakistan (Zuberi et al., 2006). Also, most of the instruments were developed and/or validated for inpatient clinical teaching (Afonso et al., 2005; Beckman et al., 2003; de Oliveira et al., 2008; Litzelman et al., 1999; Silber et al., 2005, Smith et al., 2004; Williams et al., 2001) and combined inpatient and ambulatory settings (Cohen et al., 1996; Copeland & Hewson, 2000; Cox & Swanson, 2002; Dolmans et al., 2004; Guyatt et al., 1993; Haider et al., 2015; Litzelman et al., 1999). Others were developed for ambulatory settings alone (James & Osborne, 1999; Zuberi et al., 2006), the emergency department (Steiner et al., 2000), and operating rooms and inpatient wards (Cox & Swanson, 2002; Tortolani et al., 1991).

As shown in Table 2.1, the disciplines most frequently involved in the development and/or validation of the instruments were Internal Medicine and General Practice/Family Medicine either alone (Afonso et al., 2005; Beckman et al., 2003; Guyatt et al., 1993; Litzelman et al., 1998b; Smith et al., 2004) or as part of multiple disciplines (Copeland & Hewson, 2000; Fluit et al., 2012; Haider et al., 2015; James & Osborne, 1999; Nation et al., 2011; Silber et al., 2006; Stalmeijer et al., 2008; Zuberi et al., 2006). On the other hand, few instruments were discipline-specific (Cox & Swanson, 2002; de Oliveira et al., 2008; Steiner et al., 2000; Tortolani et al., 1991). Cox & Swanson (2002) developed an instrument for assessing teaching in the Operating Room, de Oliveira et al. (2008) for assessing teaching in anaesthesia, Stenier et al. (2000) and Tortolani et al. (1991) for assessing teaching in Emergency Medicine.

The number of clinical teachers involved in the validation of the instruments varied from 9 – 711 (see Table 2.1). Most instruments were developed for assessing faculty with residents, and students acting as evaluators. In few instances, faculty peers acted as evaluators (Beckman et al., 2003; Nation et al., 2011; Stalmeijer et al., 2008). However, Haider et al. (2015) developed the WATCH instrument specifically to assess clinical teaching among junior doctors. The number of evaluators varied from 18 to 1845, and total number of evaluations from 28 to 8048 (see Table 2.1).

Table 2.1. General characteristics of instruments used in assessing teaching in the clinical settings

Authors	Period of study	Institution(s)/ Country	Specific name of instrument	Clinical setting	Disciplines	Numbers of teachers	Number of evaluators	Type of evaluators	Number of evaluations
Afonso et al., 2005	3 months, year unspecified	Midwestern Med. Sch., Detroit, USA	NS	Inpatient, coronary care unit	Int. Med	30	83	SR, MS	199
Beckman et al., 2003	12 months, year unspecified	Mayo Clinic, Rochester, USA	MTEF	Inpatient	Gen. Int. Med	10	30	Peer (Physician)	30
Benbassat & Bachar, 1981	NS	Hebrew University-Hadassah Med. Sch. Israel	NS	NS	NS	NP	76	MS	NP
Bergen et al., 1993	NS	4 institutions, USA	CTORS	Inpatient, Lecture	Int. Med	40	4	Anthro. Stud., Res Assit., Reg.Nurse	NP
Cohen et al., 1996	1985 - 1994	Univ. of Toronto, Canada	TES	Inpatient/Theatre	Surgery	43	NS	MS	3750
Copeland & Hewson, 2000	Oct. 1997 – Mar. 1999	Cleveland Clinic Foundation, Ohio, USA	CTEI	Inpatient/ Ambulatory	Int. Med, Paed., Surg., Anaes., Radio, Path	711	1845	MS, Res., and Fellows	8046
Cox & Swanson, 2002	1995 - 1999	East Carolina Univ., USA	NS	Inpatient/ Operating Room	Surgery	20 (analysis done on 16)	49	Res	753
de Oliveira et al., 2008	Mar. – Dec. 2006	4 institutions in Brazil	NS	Inpatient	Anaes.	39	19	Res	954
Dolmans et al., 2004	NS	Univ. of Maastricht Academic Hosp., Netherlands.	NS	Inpatient, Ambulatory	Paed.	13	NS	MS	NP
Donnelly & Woolliscroft, 1989	1987	Univ. of Michigan, USA	NS	Inpatient/ Ambulatory	Int. Med	300	100	MS	952
Donner-Banzhoff et al., 2003	NS	Germany	NS	GP	GP	80	80	Res	NS
Fluit et al., 2012	2009 - 2010	Radboud Univ., Nijonegen Medical Centre, Netherlands	EFFECT	Inpatient	Paed., Int. Med., Pulm.., Surg	117	106	Res	407
Guyatt et al., 1993	Sept. 1990	McMaster Univ., Hamilton, Ontario, Canada	NS	Inpatient	Int. Med	41	NS	MS, Interns, SR	NP

Authors	Period of study	Institution(s)/ Country	Specific name of instrument	Clinical setting	Disciplines	Numbers of teachers	Number of evaluators	Type of evaluators	Number of evaluations
Haider et al., 2015	Sept. 2011 – Feb. 2012	United Kingdom	WATCH	Inpatient/ outpatient	Med, Surg., O& G., Oph, Radio., Path., Psy., Paed., Anaes., GP	NP	112	Consultants, GP, Res., MS	415
Hayward et al., 1995	1990 -1993	Univ. of Michigan Med Centre, USA	Clinical/Teaching Excellence Scale	Ambulatory	Int. Med	15	NP	Res	142
Hekelman et al., 1993	Sept.- Dec. 1989	Case Western Reserve, Univ. Ohio, USA	NS	Ambulatory	Fam.Med	16	NP	Fac., Trained Res. Assistant	160
Hewson & Jensen, 1990	NS	Univ.of Wisconsin,	WICT	Ambulatory	Int. Med	11	28	Res	NP
Irby & Rakestraw, 1981	July 1977 – June 1979	University of Washington, USA	CTAF	Inpatient	Obs.&Gynae	230	320	MS	1567
James & Osborne, 1999	1996 - 1997	Univ. of New York, Buffalo, USA	MedIQ	Ambulatory	Fam Med, Paed., Int. Med	NP	131	MS	156
Litzelman et al., 1998b	Jan. 1994-Apri. 1995	Indiana Univ. Medical centre, USA.	SFDP 58	Inpatient	Int. Med	178 (87 physicians, 91 Residents)	374	MS	1581
Litzelman et al., 1999	June 1998	Indiana Univ. Medical centre, USA.	SFDP 26	Inpatient/ Ambulatory	Int. Med	38	36	Res	360
Love et al., 1982	NS	Univ. of Kentucky, USA	NS	Inpatient/ Ambulatory	Pharmacy	39	26	Pharm. Stud.	281
McLeod, 1991	1985 -1990	McGill Univ. Canada	NS	NS	Int. Med	35	50	MS	NP
Mullan et al., 1993.	NS	Michigan State Univ., USA	NS	Inpatient	Paed.	NP	NP	MS, Res, Fac	NP
Nation et al., 2011	NS	Univ. of Calgary, Canada	EFFECT	NS	Cardio, Haem.., Infect. Dis., Resp, Anaes., Comm. Med., Fam. Med., Paed.,Int. Med., O&G. Rad. Oncol., Radio., Surg.	170	317	MS, Res, Fellows	NP

Authors	Period of study	Institution(s)/ Country	Specific name of instrument	Clinical setting	Disciplines	Numbers of teachers	Number of evaluators	Type of evaluators	Number of evaluations
Ramsbottom-Lucier et al., 1994	1985-1986, 1989-1990.	Univ. of Washington, USA	CTAF	Inpatient/ Ambulatory	Int. Med	29	NP	Res	639
Risucci et al., 1992	June1988-1989	North Shore Univ. Hosp. New York, USA.	NS	NS	Surg.	62 (1988), 64 (1989)	23 (1988) 24 (1989)	Res	NP
Schum et al., 1993	Apr. 1987 – Oct. 1988	Med. Coll. Of Wisconsin, USA	NS	Inpatient	Paed.	186	749	MS, Res	2101
Shellenberger & Mahon, 1982	Jan 1979 – June 1980	Univ. of Mississippi Med. Centre, USA	PEQ	Gen. Pract.	Gen. Pract.	NP	197	MS	197
Silber et al., 2006	March – June 2005	Thomas Jefferson's Univ. USA	NS	Inpatient	Int. Med, Surg.	11	57 (54 analysed)	Res	226
Smith et al., 2004	July 2000 – June 2001	Cook County Hospital/Rush Medical College, Chicago, Illinois, USA	NS	Inpatient	Int. Med	99	145	Res	731
Solomon et al., 1997	1992 – 1996	Univ. of Texas, USA	NS	Inpatient/ Ambulatory	Int. Med.	147	NP	Res	1570
Stalmeijer et al., 2008	NS	Multi-institutions, the Netherlands	MCTQ	Inpatient	Int. Med, Paed., Surg., Obs & Gynae., ENT, Dermatology	NP	30	Educationists, Fac. Res., MS	28
Stalmeijer et al., 2010	Mar. 2007 – Dec. 2008	2 teaching hospitals, Netherlands	MCTQ	Inpatient/ Ambulatory	Int. Med, Paed., Surg., Obs & Gynae., ENT, Dermatology, Neu., Oph., Psy.	291 (126 analysed)	NS	MS	1315
Steiner et al., 2000	Dec 15, 1997 – Mar.8 1998	Univ. of Alberta, Canada.	ERS	Emergency Department	Emergency Medicine	29	18	Res	48
Tortolani et al., 1991	1988 - 1989	North Shore Univ. Hosp., Cornell Univ. Medical College, New York, USA	NS	Inpatient/ Theatre	Emergency Medicine	62 (52 analysed)	47 (23 1st Year, 24 2nd Year Residents)	Res	NP

Authors	Period of study	Institution(s)/ Country	Specific name of instrument	Clinical setting	Disciplines	Numbers of teachers	Number of evaluators	Type of evaluators	Number of evaluations
Williams et al., 2001	1995-1996 (SR) 1990-1996 (MS)	Univ. of Michigan Med Centre, USA	GRS	Inpatient	Int. Med.	129	NS	SR, MS	6743
Williams, et al. 2002	June 1998	USA	GRS	NS	Int. Med.	96	NS	Res	NP
Zuberi et al., 2006	Jan 1 – Dec. 31, 2000	Aga Khan Univ. Pakistan	SETOC	Ambulatory	Surg., Med., Oph., ENT, Fam. Med., Orthop., Paed., Obs & Gynae.	87	224	MS	NP

Table 2.1 Adapted after Beckman et al., 2005 and Fluit et al., 2010.

Key: Instruments: CCTEI – Cleveland Clinic's Clinical Teaching Effectiveness Instrument, CTAF – Clinical Teaching Assessment Form, CTEI – Clinical Teaching Effectiveness Instrument, CTORS – Clinical Teaching Observational Rating Scale, EFFECT – Evaluation and Feedback for Effective Clinical Teaching, ERS – Emergency Rotation Scale, GAS – Global Assessment Scale, GRS – Global rating Scale, MCTQ – Maastricht Clinical Teaching Questionnaire, MedIQ – Medical Instructional Quality, OTE – Overall teaching effectiveness, PEQ – Preceptor Evaluation Questionnaire, SETOC – Student Evaluation of Teaching in Outpatient Clinics, SETQ – System for Evaluation of Teaching Qualities, SFDP – Stanford Faculty Development Programme, TES – Teaching Effectiveness Scores, WATCH – Warwick Assessment Instrument for Clinical Teaching, WICT – Wisconsin Inventory of Clinic Teaching.

Disciplines: Anaes. – Anaesthesia, Cardio. – Cardiology, Comm. Med. – Community Medicine, ENT – Ear, Nose and Throat, Fam. Med – Family Medicine, GP – General Practice, Haem. – Haematology, Infect. Dis. – Infections Disease, Int. Med – Internal Medicine, Neu. – Neurology, O&G – Obstetrics & Gynaecology, Oncol. – Oncology, Oph. – Ophthalmology, Orthop. – Orthopaedics, Paed. – Paediatrics, Path. – Pathology, Psy. – Psychiatry, Pulm. – Pulmonary Medicine, Radio. – Radiology, Resp. – Respiratory Medicine, Surg. – Surgery

AP – Attending physician, Fac – Faculty, GP – General practitioners, MS – Medical students, NCS – Not clearly stated, NP – Not provided, NS – Not specified, Pharm. Stud – Pharmacy students, SR-Senior resident.

As shown in Table 2.2, many of the instruments were developed to provide constructive feedback to clinical teachers, their department heads and programme directors (formative purpose). This is meant to help in motivating objective appraisal, self-development and faculty development programmes aimed at developing the effectiveness of the clinical teachers. A number of the instruments were developed for summative purposes, that is, appraisal for promotion, tenure and/or resource allocation in addition to any formative purpose (Copeland & Hewson, 2000; Cox & Swanson, 2002; Tortolani et al., 1991; Zuberi et al., 2006).

The instruments also vary in their measurement characteristics i.e. the number of domains (1-10), the number of items (1-58), the Likert scale responses (4-10, mostly 5), the sources of items on the instrument, the validity evidence, and the learning theory that the instruments derive from (see Table 2.2). The sources of items of most of the instruments were mainly from previously validated instruments, analysis of literature, expert opinions, but infrequently from observations (see Table 2.2).

The frequency and degree of validity evidence provided in the development of the instruments also vary (see Table 2.2). Validity of an instrument refers to the ability of the instrument to measure the construct it was designed for (in this case clinical teaching) (Messick, 1989). Validity is now viewed as a single construct i.e. construct validity, and requires five sources of evidence to support it. These five sources of evidence are: content, response process, internal structure, relation to other variables and consequences (Messick, 1989). These five sources of evidence help in establishing the robustness of the validity of the instrument. As shown in Table 2.2, the majority of the instruments had limited validity evidence with regards to relation to other variables, and to the consequences which refer to the intended and unintended effects of data from the application of the instruments.

The learning theory framework underlying the development of the instrument was clearly stated only in few instruments (Beckman et al, 2003; Dolmans et al, 2004; Fluit et al, 2012; James & Osborne, 1999; Litzelman et al, 1998b; Nation et al, 2011; Stelmeijer et al, 2008; Zuberi et al, 2006). The learning theory framework derives from educational and psychological themes of learning and empirical observations of clinical teaching (Beckman et al, 2003; Litzelman et al, 1998b), situated learning and cognitive apprenticeship (Dolmans et al, 2004), experiential learning theory (James & Osborne, 1999), CanMEDS (Nation et al, 2011) and cognitive apprenticeship and learning environment (Stelmeijer et al, 2008).

Table 2.2. Measurement Characteristics of instruments developed in assessing clinical teaching

Authors	Specific name of instrument	Purpose of development	Domains of instrument	Number of items on instrument	Sources of items in instrument	Likert scale	Validity evidence					Theoretical framework
							Content	Response	Internal structure	Relation to other variables	Consequences	
Afonso et al., 2005	NS	NI	-	18	PVI	5	Yes	Yes	Yes	No	No	NCS
Beckman et al., 2003	MTEF	NI	7	28	PVI, AL, Obs.	5	Yes	Yes	Yes	No	No	Yes (fashioned after SFDP)
Benbassat & Bachar, 1981	NS	NI	-	9	NP	10	NP	Yes	Yes	Yes	No	NCS
Bergen et al., 1993	CTORS	NI	7	21	PVI	5	Yes	Yes	Yes	No	No	Yes (derived from SFDP)
Cohen et al., 1996	TES	Summative	-	4	NP	5	Yes	Yes	Yes	No	Yes	NCS
Copeland & Hewson, 2000	CTEI	Formative & summative	-	15	PVI, AL, Obs.	5	Yes	Yes	Yes	Yes	No	NCS
Cox & Swanson, 2002	NS	Formative and possibly summative	-	10	AL,EO	5	Yes	Yes	Yes	No	No	NCS
de Oliveira et al., 2008	NS	Formative	-	9	EO	4	Yes	Yes	Yes	Yes (overall perception of the quality of supervision, and perception as a role model	No	NCS
Dolmans et al., 2004	NS	Formative	5 & Global qualification	15	AL, EO, LT	5	Yes	Yes	Yes	No	No	Yes
Donnelly & Woolliscroft, 1989	NS	NI	-	12	NP	7	Yes	Yes	Yes	No	No	NCS
Donner-Banzhoff et al., 2003	NS	Formative	-	43	PVI, AL, EO	4	Yes	Yes	Yes	No	No	NCS
Fluit et al., 2012	EFFECT	Formative	7	58 (Res) 50 (Fac)	PVI, AL, EO, LT	5	Yes	Yes	Yes	No	No	Yes

Authors	Specific name of instrument	Purpose of development	Domains of instrument	Number of items on instrument	Sources of items in instrument	Likert scale	Validity evidence					Theoretical framework
							Content	Response	Internal structure	Relation to other variables	Consequences	
Guyatt et al., 1993	NS	Formative	-	14	AL, EO	5	Yes	Yes	Yes	No	No	NCS
Haider et al., 2015	WATCH	Formative	-	15	PVI, AL, EO	VAS 1-10	Yes	Yes	Yes	No	No	NCS
Hayward et al., 1995	Clinical/ Teaching Excellence Scale	Formative & summative	6	18	PVI, EO	5	Yes	Yes	Yes	No	No	NCS
Hekelman et al., 1993	NS	NI	3	17	AL, EO	NI	Yes	Yes	Yes	No	No	Yes
Hewson & Jensen, 1990	WICT	Formative	6	46	AL, EO	5	Yes	Yes	Yes	No	No	NCS
Irby & Rakestraw, 1981	CTAF	Formative & summative	4	9	PVI, AL	5	Yes	Yes	Yes	No	No	NCS
James & Osborne, 1999	MedIQ	NI	4	24	AL, EO, LT	6	Yes	Yes	Yes	Yes (grades of students, prediction of future choice of specialty)	No	Yes (Experiential learning theory)
Lewis & Pace, 1990	NS	Formative	-	16	PVI, Al, EO	VAS (1-10)	Yes	Yes	Yes	Yes (compared with qualitative data)	No	NCS
Litzelman et al., 1998b	SFDP 58	Formative	7	58	PVI, AL, LT	5	Yes	Yes	Yes	No	No	Yes (Educational and psychological themes of learning and empirical observations of clinical teaching
Litzelman et al., 1999a	SFDP 26	Formative	7	26	PVI,AL,LT	5	Yes	Yes	Yes	No	No	Yes

Authors	Specific name of instrument	Purpose of development	Domains of instrument	Number of items on instrument	Sources of items in instrument	Likert scale	Validity evidence					Theoretical framework
							Content	Response	Internal structure	Relation to other variables	Consequences	
Love et al., 1982	NS	Formative & summative (possible)	-	8 & overall estimate of clinical teaching	PVI, AL	5	Yes	Yes	Yes	Yes (compared with Res)	No	Yes
McLeod, 1991	NS	NI	7	25	PVI, EO	6	Yes	Yes	Yes	No	No	NCS
Mullan et al., 1993	NS	Formative & summative	-	17 (MS, Res), 12 (Fac.)	EO	NI	Yes	Yes	Yes	Yes (OTE)	No	NCS
Nation et al., 2011	EFFECT	Formative	10	19	PVI, AL, EO	5	Yes	Yes	Yes	No	No	NCS
Ramsbottom-Lucier et al., 1994	CTAF	NI	-	8 & OTE	PVI	6	Yes	Yes	Yes	Yes (OTE)	No	NCS
Risucci et al., 1992	NS	Formative	-	10	NP	5	NP	Yes	Yes	No	No	NCS
Schum et al., 1993	NS	Formative	-	9 & OTE	PVI, AL	7	Yes	Yes	Yes	Yes (OTE)	Yes (Annual review)	NCS
Shellenberger & Mahon, 1982	PEQ	Formative	6	34	PVI, AL, EO	4	Yes	Yes	Yes	No	No	NCS
Silber et al., 2006	NS	Formative	8	23	EO	5	Yes	Yes	Yes	No	No	Yes (critical incident)
Smith et al., 2004	NS	NI	9	32	AL, EO	5	Yes	Yes	Yes	Yes (recent wining of teaching awards, residents' desire to work with attending physician	No	Yes
Solomon et al., 1997	NS	Summative	-	13	NP	4	NI	Yes	Yes	No	No	NCS
Stalmeijer et al., 2008	MCTQ	NI	7	24	PVI, AL, Obs., LT	5	Yes	Yes	Yes	No	No	Yes (Cognitive apprenticeship and learning environment)

Authors	Specific name of instrument	Purpose of development	Domains of instrument	Number of items on instrument	Sources of items in instrument	Likert scale	Validity evidence					Theoretical framework
							Content	Response	Internal structure	Relation to other variables	Consequences	
Stalmeijer et al., 2010	MCTQ	Formative	5	14	PVI, AL, Obs., LT	5	Yes	Yes	Yes	No	No	Yes (Cognitive apprenticeship and learning environment)
Steiner et al., 2000	ERS	NI	-	4	PVI	5	Yes	Yes	Yes	Yes (Irby's instrument and Global Ass Scale)	No	NCS
Tortolani et al., 1991	NS	Formative & possible summative	2	10	NI	5	Yes	Yes	Yes	No	No	NCS
Williams et al., 2001	GRS	NS	-	1	NI	5	Yes	Yes	Yes	Yes (11-item questionnaire)	No	NCS
Williams, et al. 2002	GRS	NS	-	1	NI	5	Yes	Yes	Yes	Yes (compared with SFDP 26)	No	NCS
Zuberi et al., 2006	SETOC	Formative & summative	5	15	PVI, AL, Obs., LT	7	Yes	Yes	Yes	Yes (students' nomination for "best" teacher	No	Yes

Table 2.2 Adapted after Beckman et al., 2005 and Fluit et al., 2010.

Key: CCTEI – Cleveland Clinic's Clinical Teaching Effectiveness Instrument, CTAF – Clinical Teaching Assessment Form, CTEI – Clinical Teaching Effectiveness Instrument, CTORS – Clinical Teaching Observational Rating Scale, EFFECT – Evaluation and Feedback for Effective Clinical Teaching, ERS – Emergency Rotation Scale, GAS – Global Assessment Scale, GRS – Global rating Scale, MCTQ – Maastricht Clinical Teaching Questionnaire, MedIQ – Medical Instructional Quality, OTE – Overall teaching effectiveness, PEQ – Preceptor Evaluation Questionnaire, SETOC – Student Evaluation of Teaching in Outpatient Clinics, SETQ – System for Evaluation of Teaching Qualities, SFDP – Stanford Faculty Development Programme, TES – Teaching Effectiveness Scores, WATCH – Warwick Assessment Instrument for Clinical Teaching, WICT – Wisconsin Inventory of Clinic Teaching

AL – Analysis of literature, EO – Expert opinion, Obs – Observation, PVI – Previously validated instrument, NCS – Not clearly stated, NP – Not provided, NS – Not specified

As indicated above, many instruments developed to assess clinical teaching lacked a sound underpinning theoretical framework. A few instruments were developed to assess teaching in specific disciplines or departments and therefore cannot be used as a generic instrument to assess teaching across disciplines. In addition, some instruments contain too many items which may affect the feasibility of completing such a questionnaire.

The MCTQ assessment tool was used in this study for many reasons: it was developed specifically to measure teaching effectiveness in clinical settings with input from multiple stakeholders such as physicians, educationalists, and medical students (Stalmeijer et al., 2008). Its development involved multiple departments, which makes its use suitable in different disciplines. It is suitable for assessing clinical teaching in different clinical settings and it has established construct and content validity (Stalmeijer et al., 2008, 2009, 2013). The length of the instrument is such that it can be easily completed within 5-15 minutes. The instrument is reliable, and has sound underpinning theory, which is *cognitive apprenticeship* (Stalmeijer et al., 2008; Stalmeijer et al., 2013).

The cognitive apprenticeship model of learning derives from the old apprenticeship of training, but in addition has the element of making the process of thinking visible to the learner (Collins et al., 1991). Cognitive apprenticeship has its root in social learning theories and involves four key concepts namely: situated cognition or learning, community of practice; legitimate peripheral participation; and guided participation (Collins et al., 1991).

Situated cognition posits that learning is embedded within contexts, activity, and culture (Lave & Wenger, 1991). The students learn and perform authentic tasks within authentic contexts. This promotes acquisition of knowledge and transfer of knowledge to new situations.

Community of Practice: Learning occurs through social interactions and collaborations among students (at different stages of development) and teachers. In other words, learning is co-constructed in this community of practice (CoP).

Legitimate Peripheral Participation: New learners in the CoP start the learning process by observing tasks, and gradually moving from the *zone of actual development*, (which represents tasks that learners can do unassisted) to the *zone of proximal development*, which represents tasks that the learner can do with guidance or assistance from a more knowledgeable person who could be another learner or teacher. Learning actually takes place in the zone of proximal

development as the learner engages in increasingly complex tasks and learns the language, values, culture of the CoP (termed '*legitimate peripheral participation'*) and moves from the periphery to the centre of the community (Collins et al., 1991).

Guided Participation: refers to the support or guidance provided to learners in their zone of peripheral development as they engage in the task of increasing complexity in the CoP. Thus, the zone of proximal development represents a dynamic region which keeps shifting as the learner acquires new skills and progresses in his her learning journey.

The Clinical Apprenticeship

The principles outlined above underpin the clinical training of medical students. Medical students acquire clinical skills and professional attitudes by being part of the community of practice. The students are given the opportunity to observe and practice clinical skills in an authentic environment (clinical settings) under direct supervision of experienced doctors, who in turn provide the students with constructive feedback. As the students advance in their training, and become more proficient, the level of support given to the students in carrying out particular tasks is gradually withdrawn (fading). The students also have the opportunity to learn from many experts in the same or different fields about how to accomplish the same tasks using different methods. By making the thinking (cognitive) process visible to the learners, the advanced learners (residents) or experts (consultants) help the students to develop clinical reasoning skills. Learning in authentic contexts also ensures generalization and transferability of the knowledge to new contexts or situations.

This cognitive apprenticeship model is particularly relevant in my context (Ladoke Akintola University of Technology, Nigeria) due to limited availability of simulation facilities for training. As a result, clinical bedside teaching in various clinical settings, using real patients, remains the primary modality for teaching and learning in my context.

Residents in my setting, and other teaching hospitals in Nigeria are expected to teach undergraduate medical students. This expectation is premised on the fact that residents in Nigeria are paid a teaching allowance. However, residents do not usually have time specifically dedicated to teach. The time allocated for the clinical teaching of undergraduate students by the residents therefore depends on the workload and activities of the various units.

There is no RaT programme in my setting at Ladoke Akintola University of Technology Teaching Hospital, Nigeria. Developing suitable RaT curricular objectives that will be

consistent with institutional goals, relevant to the local setting, appropriate to the residents' learning needs, and which can be accommodated by institutional budget and resources will require a needs assessment from the perspective of multiple stakeholders.

This review highlights the important roles of the residents in the formal and informal training of undergraduate medical students, and the importance of formal training of residents in improving their teaching effectiveness through the RaT programmes. Despite the documented advantages of this educational intervention, RaT programmes are rare in sub-Saharan Africa. To ensure successful planning and implementation of a RaT programme in a limited-resource setting like Nigeria will require a robust context-specific needs assessment of the strengths and deficiencies in the residents' teaching skills. Such a needs assessment requires data collection from various stakeholders using a valid and reliable instrument. The MCTQ instrument was chosen for this study in view of the robustness of its development, which involved inputs from multiple stakeholders, its suitability in diverse clinical settings and departments, its established construct and content validity, reliability, and its sound underpinning theory, which is cognitive apprenticeship.

CHAPTER 3: RESEARCH METHODOLOGY

Study Design

This study is a cross-sectional, observational, and quantitative inquiry.

Study setting

The study setting (LAUTECH Teaching Hospital) is located in Southwest Nigeria and it is co-owned by Oyo and Osun States. The institution has two affiliated teaching hospitals located at Osogbo and Ogbomoso. This study was conducted at LTH, Ogbomoso.

Study Population

The study population consisted of junior and senior residents. Residents are those on a standard 6 (or 7) year postgraduate training programme. The first 3 years of training constitute the junior residency period and the latter 3 (or 4) years constitute the senior residency period. Junior residents only become senior residents after passing the Part I Fellowship Programme of either the West African Postgraduate College or the National Postgraduate College (of Nigeria). Residents are allowed to sub-specialize in various disciplines during senior residency period. Neurosurgery and Ear Nose and Throat specializations require a minimum of 7 years training period while other specialities require a minimum of 6 years.

LAUTECH offers a six-year Bachelor of Medicine and Bachelor of Surgery (MB;BS) program in three phases: Preliminary, Pre-clinical (Basic Medical), and Clinical. In the Preliminary phase, students undergo advanced courses in Biology, Chemistry and Physics for 12 months. Students spend the next 18 months in the Basic Medical School studying Anatomy, Biochemistry and Physiology. Successful candidates at this level proceed to the Clinical School. The Clinical School is in two sub-phases: Basic Clinical, and Core Clinical. The students study basic clinical subjects such as Morbid Anatomy and Histopathology, Chemical Pathology (Clinical Chemistry), Haematology and Medical Microbiology. The core clinical subjects are Obstetrics & Gynaecology, Paediatrics, Internal Medicine, Surgery, Public Health, and Psychiatry. The MB;BS curriculum is predominantly discipline-based with little integration. Figure 3.1 shows a building block representation of the curriculum.

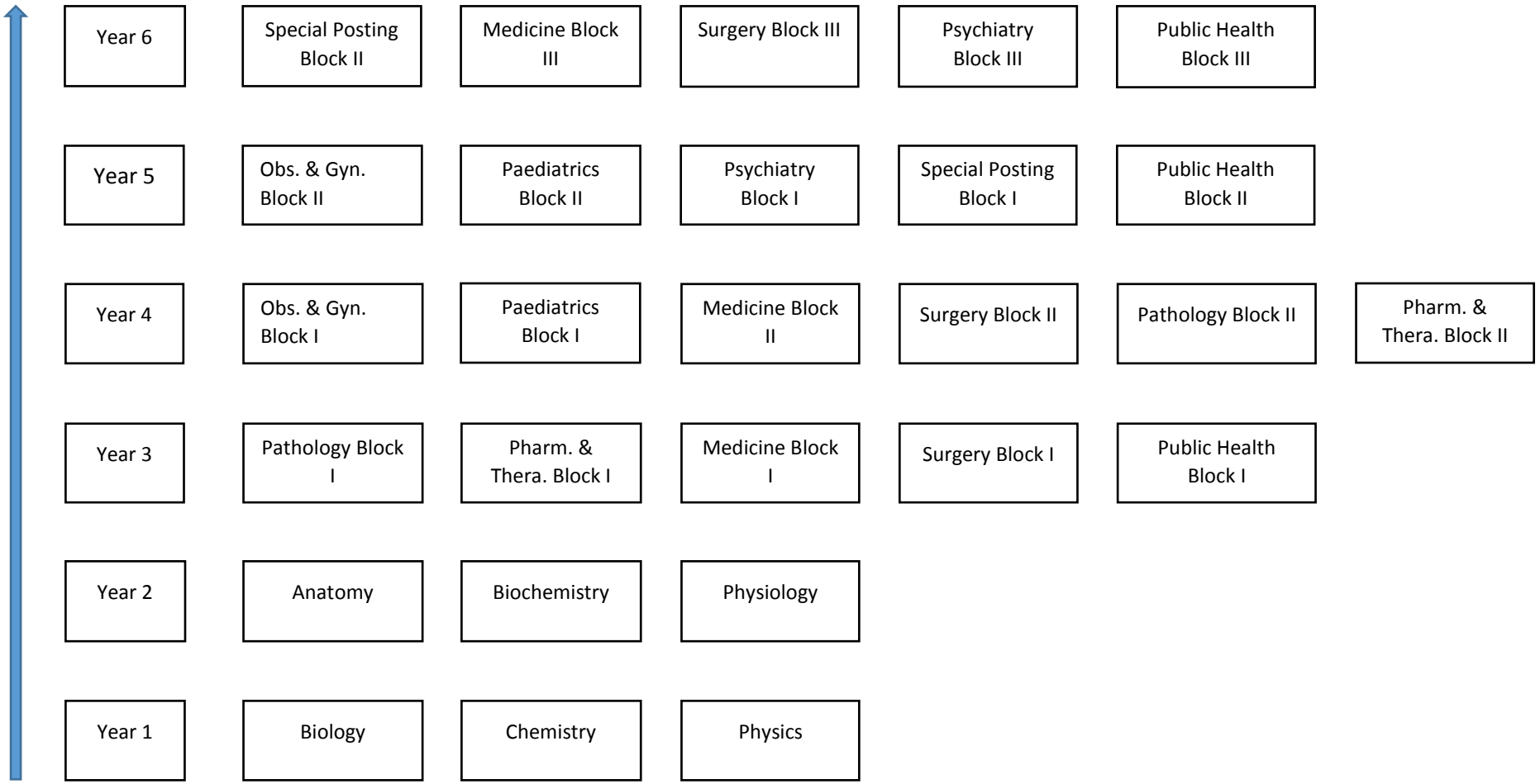

Figure 3.1. Building block representation of the MB;BS curriculum

Key: Pathology consists of: Morbid Anatomy & Histopathology, Chemical Pathology, Medical Microbiology, and Haematology

Years 4 to 6 of the six-year undergraduate medical programme at LAUTECH are spent in the clinical settings and are devoted to clerkships in the academic hospitals and the affiliated primary health care centres. Clinical rotations in the academic hospitals last between 4 to 8 weeks per rotation depending on the discipline (specialty). The students spend 8 weeks per rotation in Medicine, Surgery, and Public Health in Years 4, 5, and 6. Also, students spend 8 weeks in Paediatrics, and Obstetrics & Gynaecology in Clinical Years 4 and 5. They also have 4 weeks rotations in Ophthalmology, Anaesthesia, Ear, Nose & Throat (ENT), and Radiology in Years 5 and 6. The sequence of rotation differs among students. During the clinical rotation, students spend time in the wards, Outpatient Clinics, Accident & Emergency Units and surgical theatres. Clinical teaching takes place in all these settings during the rotations. The students are divided into groups during clinical rotations. Each group consists of 3 to 8 students depending on the clinical rotation.

In my setting, residents are involved in the following forms of teaching: (1) small group tutorial teaching on a clinical topic away from the patient, (2) structured clinical bedside teaching around a patient chosen for the demonstration of a particular pathology, and (3) teaching during normal in-patient care activities (such as ward rounds, and the performance of procedures) and outpatient clinics. For this research work, the assessment focused on structured clinical bedside teaching around a particular patient to demonstrate particular pathology.

Components of the Study Design

This study involved a self-assessment by residents involved in the clinical teaching of undergraduate medical students in order to determine the residents' self-perceived learning needs in facilitating teaching and learning in the clinical setting. In addition, the undergraduate students (who were recipients of the clinical teaching) and I (who served as an unobtrusive observer) assessed the residents' clinical teaching to determine the true learning needs of the residents in facilitating teaching and learning in the clinical setting. This approach of obtaining data from multiple sources was adopted to overcome the flaws inherent in self-assessment and to provide a more reliable, comprehensive, and complementary view of our residents' strengths and weaknesses in facilitating teaching and learning in the clinical setting.

Selection of Participants

Selection of Residents

There were 64 residents in the employment of LTH, Ogbomoso during the period of study (see Table 3.1). Residents in Laboratory Medicine Specialties (Chemical Pathology, Haematology, Morbid Anatomy & Histopathology, and Medical Microbiology), and Radiology were excluded from the study because they do not deliver clinical bedside teaching during students' rotation through these departments. Residents in Departments of Ear, Nose & Throat (ENT), and Ophthalmology were also excluded because the students' rotations take place only at the second teaching hospital (LTH, Osogbo). There was no resident in Department of Anaesthesia during the period of study. Thus, only 50 residents were eligible to participate in the study. All the residents (the total number of 50) were invited to participate in the study through a meeting with the residents after getting the approval of the various Heads of Departments.

Table 3.1. Distribution of the residents in the employment of Ladoke Akintola University of Technology, Ogbomoso during the course of the study

Department	**Total number of residents in various departments (64) N (%)**	**Total number of residents eligible to participate in the study (50) N (%)**
Internal Medicine	10 (15.6)	10 (20.0)
Family Medicine	5 (7.8)	5 (10.0)
Obstetrics & Gynaecology	11 (17.2)	11 (22.0)
Paediatrics	9 (14.1)	9 (18.0)
Psychiatry	3 (4.7)	3 (6.0)
Surgery	12 (18.8)	12 (24.0)
Anaesthesia	0 (0)	0 (0)
Ear, Nose & Throat	2 (3.1)	0 (0)
Ophthalmology	4 (6.3)	0 (0)
Chemical Pathology	2 (3.1)	0 (0)
Haematology	2 (3.1)	0 (0)
Medical Microbiology & Parasitology	2 (3.1)	0 (0)
Morbid Anatomy & Histopathology	2 (3.1)	0 (0)

In view of the small population of residents, the invitation was extended to all residents without consideration of the status (junior or senior). While it is true that senior residents may have more knowledge about a particular speciality or subject matter, and have been recipients of more teaching when compared to junior residents, these attributes do not necessarily make them better teachers (Edwards et al., 1988; Owolabi et al., 2014).

Thirty nine residents consented to participate in the study. The initial plan was to randomly select 30 residents from those who consented to having their clinical teaching session observed if their number was more than 30. However, only 20 out of 39 residents consented to observation of their clinical teaching session. Therefore, all the teaching sessions were observed. The residents' study sample therefore consisted of 2 groups: Group A, (n = 20) which comprised of residents who had their clinical teaching sessions observed; and Group B, (n = 19) which comprised of residents who declined direct observation of their clinical teaching session, and therefore only completed the 24-item Maastricht Clinical Teaching Questionnaire (MCTQ) for self-assessment of their clinical teaching.

Selection of Students

There were 76 medical students in Year 5 and Year 6 who were having their rotations. All were invited to participate in the study and 62 agreed. The Year 5 students were rotating through Paediatrics and Obstetrics & Gynaecology, while the Year 6 students were rotating through Internal Medicine, and Surgery at the time of data collection. In view of the small number of the students in a group (4 to 8), all students in any particular group were invited to participate.

Study Instrument

The 24-item Maastricht Clinical Teaching Questionnaire (MCTQ) was used for this study. The MCTQ is based on the principle of cognitive apprenticeship in the clinical environment (Brown et al., 1989; Stalmeijer et al., 2008, Stalmeijer et al., 2013). The MCTQ has seven domains (components) i.e. *modelling* (items 1-4), *coaching* (items 5-7), *scaffolding* (items 8-11), *articulation* (items 12-15), *reflection* (items 16-17), *exploration* (items 18-20), and *general learning climate* (items 21-24). Each of the 24 item is rated on a 5-point Likert scale from 1 – 5, where 1 = strongly disagree, 2= disagree, 3 = neutral, 4 = agree and 5 = strongly agree. In addition, there is an overall judgement of the clinical teaching (scale 1 – 10). The MCTQ is in the public domain and requires no formal approval by researchers who developed the questionnaire.

In the *modelling* component, the learners observe the teacher as s/he demonstrates how to accomplish different parts of a task. This explicit demonstration of a task helps the students to build a conceptual model of the processes involved in accomplishing the task. In so doing, the cognitive or internal processes of the teacher are externalized in order for the learner to observe and practice the skills (Stalmeijer et al., 2008, Stalmeijer et al., 2013). The C*oaching*

component refers to guidance and feedback provided by the teacher to the students as s/he observes the student as s/he carries out a task. The teacher also points to the student those aspects of his or her performance that needs to be improved (Stalmeijer et al., 2008, Stalmeijer et al., 2013).

In *scaffolding* component, the teacher establishes the current level of the students and tailors his/her teaching to the students' level. Thereafter, the teacher gradually increases the level of complexity of a task (Stalmeijer et al., 2008, Stalmeijer et al., 2013). As the students' rise up to the performance of the new task, the teacher gradually withdraws the support *(fading*) as the learner manages to complete the task on his/ her own unaided. A*rticulation* occurs as the teacher encourages the student to make explicit his/her knowledge by providing explanation about his/her performance. This helps the student to refine and reorganize his/her understanding of new concepts, leading to generation of new knowledge and extension of the knowledge to new situations or novel circumstances (Stalmeijer et al., 2008, Stalmeijer et al., 2013).

The teacher encourages the student to think through the performance of a task and voice out his/her strengths and weaknesses (*reflection*) (Stalmeijer et al., 2008, Stalmeijer et al., 2013). This helps to bring the student's knowledge to his/her awareness (metacognition). In the *exploration* component, the student is encouraged to formulate his/her learning goals. The teacher may, however, set the *general learning goal.* This helps the student to engage in independent, self-directed learning (Stalmeijer et al., 2008, Stalmeijer et al., 2013).

Data Collection

Figure 3.2 shows the chart showing the steps involved in the study. The goals and procedures of the study were fully explained to the residents, medical students and patients involved in the study. The participants were informed of the potential benefits of the research; as well as their rights to raise any concerns or questions relating to the study. Participation was voluntary and participants were at liberty to withdraw from the study at any point without any negative or adverse consequences. The participants were also informed that they will come to no harm by participating in the study. All the questionnaires and clinical teaching assessment tools bore only research code numbers and not the names of the participants. The collected data were stored on a password-protected computer and no unauthorized person had any access to the

data. The coded participants' numbers could not be linked in any way to the names of the participants.

The date and time for the clinical bedside teaching sessions were fixed by the residents and undergraduate medical students, and the information was subsequently conveyed to me. I was present to personally observe the teaching sessions. The residents were informed before the onset of the clinical bedside teaching that the duration of teaching session was expected to be between 40 to 60 minutes. I timed the duration of each teaching session by keeping a record of the onset and the end of each session. However, I did not interfere with any teaching session that lasted for more than 60 minutes. I also made field notes on each clinical teaching session.

Informed and written consent were obtained from the residents (Appendix I) and the students (Appendix II). The data collection instrument for the residents was in two sections (A & B). Section A contained the self-administered questionnaire, and was developed based on the objectives of the study and literature review. Section A assessed the time dedicated to teaching of medical students by residents, the residents' perception about formal training in teaching, previous formal training in teaching, ranking of the relative importance of the topics that could be included in a RaT curriculum, and the preferred teaching methods for such an intervention. It also included demographic data such as gender, age, year of commencing residency training and current residency status of the respondents. Section B contained the MCTQ assessment tool (Appendix III).

The data collection instrument for the students contained demographic data such as gender, age, current year of study, current clinical rotation, and the 24-Item MCTQ Tool (Appendix IV).

The 24-item MCTQ was used to evaluate the clinical teaching by the residents. This evaluation was done by the residents, the students who were recipients of the clinical teaching, and I as the researcher. Each of the 24 items was scored on a Likert scale from 1-5 (where 1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree). The students and I also gave an overall judgment of each resident's clinical teaching performance on a scale of 1-10 and 'a mark lower than 6 was judged insufficient' (Stalmeijer et al., 2010, p. 1734).

Verbal consent of patients were obtained before any bedside clinical teaching. Patients who declined to participate in bedside clinical teaching were not involved in the study. Residents who consented to an observation of their clinical bedside teaching session (Group A) completed the study instruments after the teaching sessions. Therefore, residents were not exposed to the MCTQ until after the teaching session. This was to prevent the residents from being guided to alter their teaching behaviour during the observation. I met with medical students before the commencement of each clinical bedside teaching session and explained the various components of the MCTQ tool to them. This was meant to facilitate their understanding of the tool and guide them in their assessments of the residents' teaching capability after the teaching session. Undergraduate medical students who were recipients of the clinical bedside teachings completed the MCTQ tool after the clinical teachings by the residents. I also completed the MCTQ tool after directly observing the residents' teaching session (Appendix V). The residents were observed only after the students had spent three weeks or more in a particular unit/department. This was to ensure that the students and residents had 'settled in' and were familiar with the learning environment.

Residents who declined direct observation of their clinical teaching sessions (Group B) completed the self-administered questionnaire and the self-assessment MCTQ after I had concluded observations of teaching sessions by the Group A residents. This approach was adopted to prevent premature exposure of the MCTQ tool to Group B residents, who may inadvertently share the tool with residents who would be observed. This may have encouraged the Group A residents to modify their teaching, and thus negatively impact the quality of the data. The completion of the MCTQ took 10–15 minutes. Figure 3.2 shows the flow chart depicting step-by-step process of the study protocol.

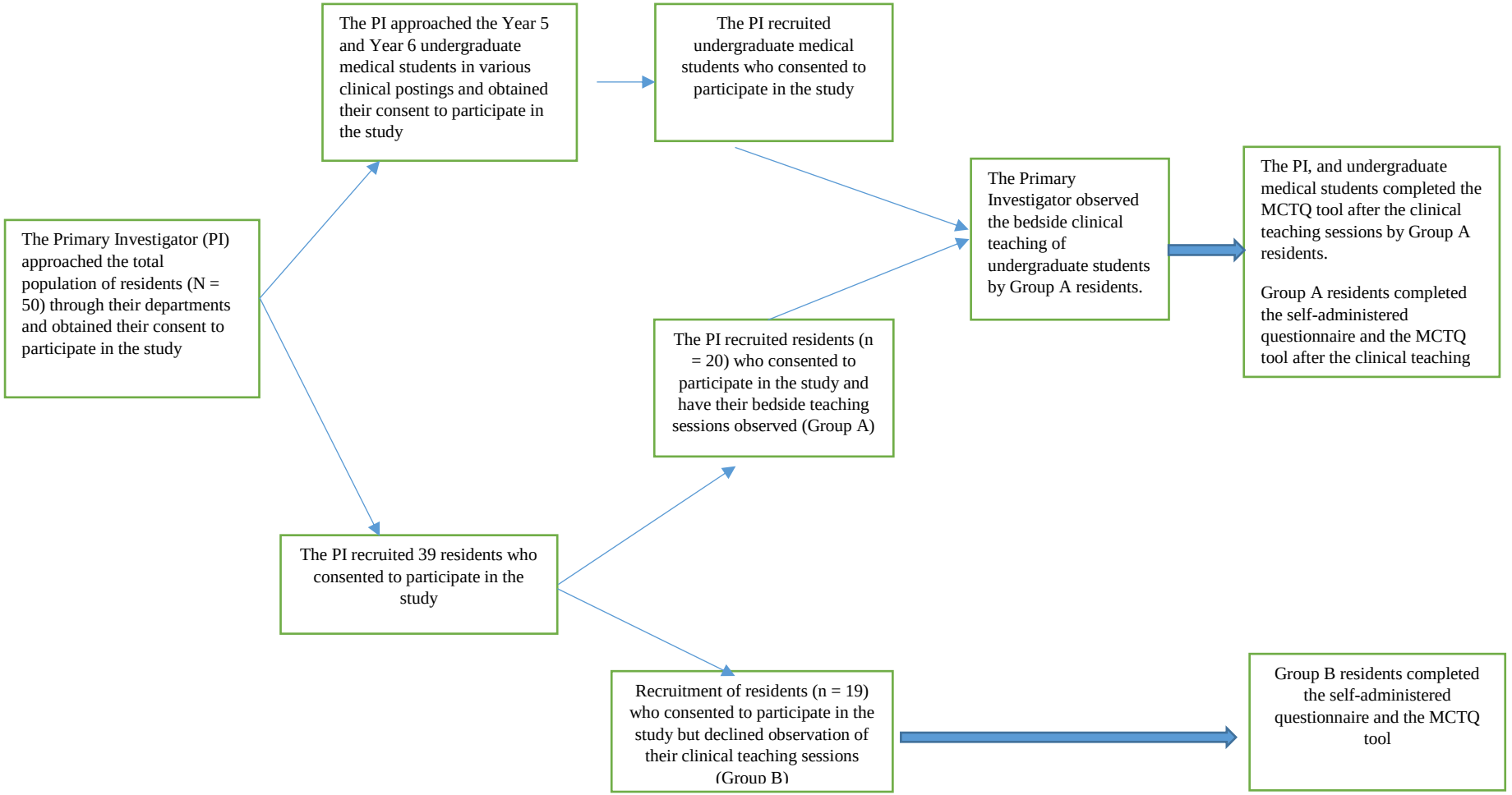

Figure 3.2. Flow chart showing steps involved in the study

Ethical Approval

Ethical approval for the study was obtained from the Health Research Ethics Committee of Stellenbosch University, Tygerberg, South Africa (HREC Reference Number S18/06/121, Project ID 7467), [Appendix VI] and the Ethics Committee of Ladoke Akintola University of Technology Teaching Hospital, Ogbomoso, Nigeria (LTH/OGB/EC/2018/180) [Appendix VII].

Data Analysis

The data generated were analysed using the Statistical Package for Social Sciences Version 20 (SPSS, Inc., Chicago, IL, USA). Discrete data were summarized as percentages, and quantitative data as means (standard deviation [SD]). The mean score (SD) of each item of the MCTQ instrument for a resident was calculated by averaging the ratings of each item for that particular resident. The mean score (SD) for each domain of the MCTQ instrument was obtained by dividing the total scores from all the items in the domain with the total number of items in the domain. Differences in discrete and continuous variables were analysed using chi square and student's t test respectively. All p values ≤ 0.05 were considered to be statistically significant.

Table 3.2 shows the representation of the data set and inferences that can be drawn from the analyses of that data set. The residents' self-perceived learning needs with regards to clinical teaching were obtained from the mean scores of the components of the completed MCTQ.

The difference in the mean MCTQ scores by observed residents and undergraduate medical students using the student's t test was used in determining the residents' true learning needs from the students' perspectives. Similarly, the difference in the mean MCTQ scores by the observed residents and my MCTQ scores was used in determining the residents' true learning needs from my perspectives. The mean MCTQ scores of the junior and senior residents were also compared to determine differences in the perceived and true learning needs of junior and senior residents. The internal reliabilities of the items in the seven domains of the MCTQ were determined by calculating the Cronbach's coefficient alphas for each of the seven domains of the MCTQ scores by the students and by me (the researcher). Cronbach's alpha scores ≥ 0.7 were considered acceptable as good evidence of reliability and values <0.3 indicated that the item might be measuring something different from the scale as a whole. We also calculated the correlation between the factor scores and the overall judgement using Spearman's correlation.

Table 3.2. Representation of data set and inferences able to be drawn from analyses

Representation of Data Set	**Inferences able to be drawn from analyses of data set**
Residents' self- completed MCTQ	Determination of residents' self-perceived learning needs.
Comparison of observed residents' MCTQ with students' MCTQ scores using the student's t test.	Determination of residents' true learning needs from the students' perspective.
Comparison of observed residents' MCTQ with researcher's MCTQ scores using the student's test.	Determination of residents' true learning needs from the researcher's perspective.
Comparison of Students' MCTQ with researcher's MCTQ scores using the student's test.	Determination of differences of residents' true learning needs as detected by students and the researcher.
Comparison of observed residents' MCTQ with unobserved residents MCTQ scores using the student's test.	Determination of differences in self-perceived learning needs of observed and unobserved residents.
Comparison of self-evaluated MCTQ scores of junior and senior residents using the student's test.	Determination of differences in the self-perceived learning needs of the junior and senior residents.
Comparison of the researcher's MCTQ scores of junior and senior residents using the student's test.	Determination of differences in the true learning needs of the junior and senior residents from the researcher's perspective.
Comparison of the undergraduate medical students' MCTQ scores of junior and senior residents using the students' test.	Determination of differences in the true learning needs of junior and senior residents from the students' perspective.

Researcher Influence and Envisaged Risk

The participants of the study were assured that non-participation in the study will not influence academic evaluation whatsoever. I am a lecturer in the Department of Medicine at Ladoke Akintola University of Technology (LAUTECH), and Honorary Consultant Physician to LAUTECH Teaching Hospital, Ogbomoso, Nigeria. I do not hold any other official position in the university and the teaching hospital during the period of study. As a lecturer in the university, he is involved in the evaluation of undergraduate medical students in the Department of Medicine. The evaluation of the medical students in my university involves multiple examiners; this helps in reducing possible stigmatisation and power abuse. The institutional evaluation of resident doctors also involves multiple examiners, and this also should help in mitigating against stigmatisation and power abuse. Although I am an examiner with the Faculty of Internal Medicine of West African Postgraduate Medical College,

examination of residents involves multiple paired examiners, and the decision to pass or fail any candidate does not rest on a single examiner. Also, each examiner is expected to declare his/her conflict of interest, and to a large extent he/she is not expected to examine candidates from his/her training centre.

CHAPTER 4: RESULTS

Demographics and background information of the study participants

Thirty-nine residents out of 50 residents participated in the study, giving a participation rate of 78%. Participation in the study cut across all departments whose residents were involved in undergraduate medical training as shown in Table 4.1. The level of participation by residents in the study ranged from 64% to 100% (see Table 4.1). Eleven residents (22%) did not participate in the study for various reasons: two residents in surgery were on rotations in another teaching hospital, two residents were on annual vacation, and seven residents declined participation in the study.

Twenty (51%) residents consented to observation of their clinical bedside teaching sessions. In view of the fact that medical students were not on rotation in the Family Medicine and Psychiatry departments during the period of study, clinical bedside teaching by residents in these departments could not be observed. The highest percentage of residents whose clinical teaching sessions were observed was in Internal Medicine (100%). The lowest percentage of residents who were observed was in Surgery (37.5%).

Table 4.1. Distribution of the residents according to their participation status

Departments	**Total population of residents in all the eligible departments N=50 (% of total population of residents)**	**Number of residents who participated in the study N=39 (% of total in the dept.)**	**Residents whose clinical bedside teaching sessions were observed N=20 (% of total participation)**	**Residents whose clinical bedside teaching sessions were not observed N=19 (% of total not observed)**
Int. Med.	10 (20.0)	8 (80.0)	8 (100.0)	0 (0.0)
Fam. Med.	5 (10.0)	4 (80.0)	0 (0.0)	4 (100.0)
Obs. & Gynae.	11 (22.0)	7 (64.0)	3 (43.0)	4 (57.0)
Paediatrics	9 (18.0)	9 (100.0)	6 (67.0)	3 (33.0)
Psychiatry	3 (6.0)	3 (100.0)	0 (0.0)	3 (100.0)
Surgery	12 (24.0)	8 (67.0)	3 (37.5)	5 (62.5)

Key: Int. Med – internal Medicine, Fam. Med – Family Medicine, Ob.s & Gynae. – Obstetrics & Gynaecology, dept. – department

Table 4.2 shows the demographic profile and background information of residents who participated in the study. The residents' study sample consisted of 29 (74.4%) males, and 10 (25.6%) females. The male:female sex distribution of the residents reflected the sex distribution of the total population of residents in the hospital that was 3:1 during the period of study. Twenty-four (61.5%) residents were senior residents while 15 (38.5%) were junior residents. This distribution of senior to junior residents also reflected the distribution of the total number

of senior to junior residents in the hospital which was 60% to 40% during the period of study. The mean age and standard deviation (SD) of the residents was 36.4 ± 4.3 years (range 27 – 48 years). There was no statistically significant difference in the mean ages of the male and female residents (36.5 ± 4.5 vs. 36.2 ± 4.0 years, t = 0.197, p = 0.845). The senior residents were significantly older than the junior residents (37.8 ± 3.6 vs. 34.3 ± 4.7 years, p = 0.015). The duration of residency training ranged from 1 - 9 years (median 4 years).

We compared the demographic and background information Group A, the residents whose clinical teaching sessions were observed with Group B, the residents whose teachings were not observed to find out if there were differences in their characteristics that may influence our findings (see Table 4.2). The sex distribution, age group, mean age, and duration of residency

Table 4.2. Demographics and background information of the residents who participated in the study

	Observed Residents [Group A] N=20 (% of observed)	**Unobserved Residents [Group B] N=19 (% of unobserved)**	**Total Residents N=39 (% of total population)**	**P value**
Sex				
Female	5 (25.0)	5 (26.3)	10 (25.6)	0.925
Male	15 (75.0)	14 (73.7)	29 (74.4)	
Age group (years)				
27 - 31	1 (5.0)	3 (15.8)	4 (10.0)	0.425
32 - 36	10 (50.0)	7 (36.8)	17 (43.6)	
37 - 41	8 (40.0)	6 (31.6)	14 (35.9)	
≥42	1 (5.0)	3 (15.8)	4 (10.3)	
Mean age (years)	36.0 ± 4.0	36.9 ±4.7	36.4 ± 4.3	0.527
Residency status				
Junior resident	11 (55.0)	4 (21.1)	15 (38.5)	0.048
Senior resident	9 (45.0)	15 (78.9)	24 (61.5)	
Duration of residency training (years)				
< 2	8 (40.0)	4 (21.1)	12 (30.8)	0.392
2 - 3	1 (5.0)	0 (0.0)	1 (2.6)	
3 - 4	5 (25.0)	4 (21.1)	9 (23.1)	
4 - 5	3 (15.0)	4 (21.1)	7 (17.9)	
5 - 6	1 (5.0)	4 (21.1)	5 (12.8)	
>6	2 (10.0)	3 (15.6)	5 (12.8)	

training of residents whose clinical bedside teaching sessions were not observed (Group B) were comparable to those of residents whose clinical bedside teaching sessions were observed (Group A) (see Table 4.2). However, the number of junior residents who consented to

observation was significantly higher when compared to senior residents (55% vs. 45%, p = 0.048).

Table 4.3 shows the demographic characteristics and the number of teaching sessions assessed by the undergraduate medical students. Twenty-eight out of the 30 students (93.3%) rotating through Paediatrics and Obstetrics & Gynaecology participated in the study, while 34 out of 43 students (81%) rotating through Internal Medicine and Surgery participated in the study (see Table 4.3). Males constituted 60.7% and 64.7% of Year 5 and Year 6 students respectively. The sex distribution of the study participants reflected the distribution of the sex within the two classes during the period of study which was 1.8:1 (male:female). The mean age of the students was 28.7 ± 4.6 years, with no statistically significant difference in the mean ages of Year 5 and Year 6 students (28.5 ± 4.4 vs. 28.9 ± 4.8 years, t = 0.326, p = 0.746). The male medical students were significantly older than the female students (30.1 ± 5.2 vs. 26.4 ± 1.3 years, t = 4.194, p <0.001). Forty-two (74.2%) students took part in one teaching session, 12 (17.4%) in two teaching sessions and four (6.4%) took part in three clinical teaching sessions giving a total of 82 assessments by the students (Table 4.3).

Table 4.3. The demographic characteristics and the number of teaching sessions assessed by the undergraduate medical students.

	Year 5 students who participated in the study N=28 (% of total year 5 students)	**Year 6 students who participated in the study N=34 (% of total year 6 students)**	**Total number of medical students who participated in the study N=62 (% of total population of students)**
Sex			
Female	11 (39.3)	12 (35.3)	23 (37.1)
Male	17 (60.7)	22 (64.7)	39 (62.9)
Age (years)			
24 – 28	19 (67.9)	22 (64.7)	41 (66.1)
29 – 33	7 (25.0)	9 (26.5)	16 (25.8)
≥ 34	2 (7.1)	3 (8.8)	5 (8.1)
Mean age (years)	28.5 ± 4.4	28.9 ± 4.8	28.7 ± 4.6
Total observations			
1	21 (75)	25 (73.5)	46 (74.2)
2	7 (25)	5 (14.7)	12 (19.4)
3	0 (0)	4 (11.8)	4 (6.4)

Residents' responses to the group of students taught, time spent on teaching, perceived level of competence, and previous formal training in teaching

Residents were asked to rank from 1 (the students they spend the most amount of time teaching) to 4 (the students they spend the least amount of time teaching). Twenty-six (67%) residents ranked undergraduate students as the students whom they spend the most amount of time teaching. Interns, other residents, and nursing students were ranked second, third and fourth respectively by residents as students whom they spend the most amount of time teaching (see Table 4.4).

*Table 4.4. Ranking by residents of the group of students whom the residents spent most time teaching

Ranking	Group of Students	Frequency of ranking (N=39)
1	Undergraduate medical students	26
2	Interns	22
3	Residents	19
4	Nursing students	27

*Note: 1 (the students residents spent the most time teaching) to 4 (the students residents spent the least time teaching)

Residents in my setting, and other teaching hospitals in Nigeria are paid a teaching allowance, and thus, are expected to teach undergraduate medical students and fellow residents. Residents do not usually have time dedicated specifically to teach. Periods fixed for clinical bedside teaching are often dictated by the clinical activities of the various units. We sought to know whether residents were aware of their teaching responsibility by asking whether clinical bedside teaching was part of their schedule. Thirty-four (87%) residents indicated that clinical bedside teaching was part of their schedule while five (13%) residents indicated that clinical bedside teaching was not. When asked about the time spent by residents on clinical bedside teaching of undergraduate medical students, 22 (57%) residents indicated they spent 2-5 hours per week, 13 (33%) spent 6–10 hours, while four (10%) spent 11 hours or more per week in teaching. The median time per week spent by residents in teaching undergraduate medical students was 5 hours (range 2-21 hours). Though junior residents indicated they spent more hours teaching undergraduate medical students than senior residents, the difference was not statistically significant (8.1 ± 6.5 vs. 6.6 ± 2.9 hours, $p = 0.414$).

When asked to rate their competency to teach undergraduate medical students, 22 (56%) residents rated themselves as somewhat competent while 17 (44%) rated themselves as fully competent. More senior residents rated themselves as being fully competent (13/24, 54%) compared to junior residents (4/15, 27%) though this difference was not statistically significant

(x^2 = 2.839, p = 0.092). There was also no statistically significant difference in the frequency of residents who rated themselves as fully competent to teach among the observed (8/20, 40%) and the non-observed groups (9/19, 48%) (x^2=0.215, p =0.643).

Two thirds of the residents (26) had never had formal training in teaching while 13 (33%) had had formal training in teaching. Multiple training methods were used to train those who had had formal training in teaching and the methods included lectures (five, 38.5%), %), seminars (five, 38.5%), workshops (two, 15.4%), videos (two, 15.4%), handouts (two, 15.4%), and direct observations of teaching sessions (two, 15.4%).

When asked about the importance of developing their teaching skill, 37 (95%) residents indicated that skill development in teaching is very important, while two (5%) considered skill development in teaching somewhat important. All the residents expressed the desire to be trained in developing their teaching skills.

From the record of the duration of each teaching session kept by me, the mean duration of the teaching sessions by the 20 residents who consented to direct observation of their clinical teaching session was 61.0 ± 17.5 mins (range 40 – 100 minutes). Eleven (55%) residents taught for ≤60 minutes while nine (45%) taught for >60minutes. The total duration of observation of the residents' teaching was 1219 minutes (20.32hours).

Residents' self-perceived learning needs in facilitating teaching and learning in the clinical setting

Table 4.5 outlines the self-assessment by residents using MCTQ. The teaching actions which most residents agreed or strongly agreed that they used were related to items in the domains of coaching (items 5-7), scaffolding (items 8-10), and general learning climate (items 21-24). Most residents also agreed or strongly agreed that they explained the importance of different aspects of a task to the students (item 2), and were supportive to students when they experienced difficulties with a task (item 10).

The residents' self-perceived learning needs for facilitating teaching and learning in the clinical setting were determined by the teaching actions the fewest residents agreed or strongly agreed that they used during the course of teaching. As shown in Table 4.5, the teaching actions that the fewest residents agreed or strongly agreed that they used were item 18 (stimulated the students to formulate their own learning goals) [66.7% rated either agree or strongly agree], and item 11 (gradually decreased the amount of guidance in order to bolster the students' independence) [59% rated either agree or strongly agree].

Table 4.5. Residents' Responses to the Maastricht Clinical Teaching Questionnaire

		Strongly disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly agree	Rated agree or strongly agree
		N = 39 (%)					
Modelling							
1	I demonstrated how different tasks should be performed.	0(0.0)	0(0.0)	6 (15.4)	23 (59.0)	10 (15.6)	33 (84.6)
2	I explained, while performing a task, which aspects were important and why.	0(0.0)	0(0.0)	4 (10.3)	19 (48.7)	16 (41.0)	35 (89.7)
3	I created sufficient opportunities for the students to observe me	0(0.0)	0(0.0)	9 (23.1)	19 (48.7)	11 (28.2)	30 (76.9)
4	I was a role model for the medical students	0(0.0)	3 (7.7)	7 (17.9)	16 (41.0)	13 (33.3)	29 (74.3)
Coaching							
5	The students observed me while I was performing a task.	0(0.0)	1 (2.6)	4 (10.3)	14 (35.9)	20 (51.3)	34 (87.2)
6	I provided the students with constructive and concrete feedback during or following direct observation.	0(0.0)	0(0.0)	5 (12.8)	21 (53.9)	13 (33.3)	34 (87.2)
7	I gave the student(s) a better insight into aspects of his/her/their performance that needed improvement.	0(0.0)	0(0.0)	7 (17.9)	14 (35.9)	18 (46.2)	32 (82.1)
Scaffolding							
8	I adjusted my teaching activities to the student's (students') level of experience and competence.	0(0.0)	0(0.0)	7 (17.9)	18 (46.2)	14 (35.9)	32 (82.1)
9	I allowed the student(s) to perform tasks that fit his/her/their level of experience and competence.	0(0.0)	3 (7.7)	4 (10.3)	21 (53.8)	11 (28.2)	32 (82.1)
10	I was supportive to the student(s) when he/she/they experienced difficulties with a task.	0(0.0)	1 (2.6)	3 (7.7)	24 (61.5)	11 (28.2)	35 (89.7)
11	I gradually decreased the amount of guidance in order to bolster the Student's (students') independence.	0(0.0)	5 (12.8)	11 (28.2)	19 (48.7)	4 (10.3)	23 (59.0)
Articulation							
12	I asked the student(s) to explain his/her/their reasoning and arguments.	1 (2.6)	1 (2.6)	5 (12.8)	19 (48.7)	13 (33.3)	32 (82.0)
13	I alerted the student(s) to gaps in his/her/their knowledge and skills.	0(0.0)	0(0.0)	6 (15.4)	18 (46.2)	15 (38.4)	33 (84.6)
14	I asked questions to increase the student(s) understanding.	0(0.0)	0(0.0)	2 (5.1)	9 (23.1)	28 (71.8)	37 (94.9)
15	I stimulated the student(s) to ask questions to increase his/her/their understanding.	0(0.0)	1 (2.6)	5 (12.8)	8 (20.5)	25 (64.1)	33 (84.6)
Reflection							
16	I stimulated the student(s) to think about his/her/their own strengths and weaknesses.	1 (2.6)	0(0.0)	8 (20.5)	20 (51.3)	10 (25.6)	30 (76.9)
17	I stimulated the student(s) to think about how to improve his/her/their own strengths and weaknesses.	1 (2.6)	0(0.0)	5 (12.8)	23 (59.0)	10 (25.6)	33 (84.6)
Exploration							
18	I stimulated the student(s) to formulate his/her/their own goals	0(0.0)	2 (5.1)	11 (28.2)	22 (56.4)	4 (10.3)	26 (66.7)
19	I stimulated the student(s) to achieve his/her/their own goals	0(0.0)	1 (2.6)	7 (17.9)	22 (56.4)	9 (23.1)	31 (79.5)
20	I challenged the student(s) to explore new tasks and possibilities.	0(0.0)	1 (2.6)	5 (12.8)	19 (48.7)	14 (35.9)	33 (84.6)
General Learning Climate							
21	I established a safe-learning environment.	0(0.0)	0(0.0)	5 (12.8)	18 (46.2)	16 (41.0)	34 (87.2)
22	I showed an interest in the student(s).	0(0.0)	0(0.0)	3 (7.7)	18 (46.1)	18 (46.2)	36 (92.3)
23	I treated the student(s) with respect.	0(0.0)	0(0.0)	3 (7.7)	13 (33.3)	23 (59.0)	36 (92.3)
24	I took enough time to supervise the students.	0(0.0)	2 (5.1)	5 (12.8)	19 (48.7)	13 (33.3)	32 (82.0)

Comparison of the self-perceived learning needs of the observed and unobserved residents

We needed to ascertain whether the self-perceived learning needs of the observed residents (Group A) were different from the unobserved residents (Group B). In order to do this, we compared the differences in the mean Likert scale scores of individual items (rated on a scale of 5), and individual domains (rated on a scale of 5) of the self-completed MCTQ by the two groups of residents (see Table 4.6). There were no statistically significant differences in the mean Likert scale scores of the items and domains of the MCTQ indicating that the self-perceived learning needs of the two groups of residents are comparable.

Table 4.6. Comparison of mean ratings and standard deviations on a Likert scale of self-rating of the observed and unobserved residents

		Observed Residents (20 evaluations)		Unobserved residents (19 evaluations)		P value
		Mean	SD	Mean	SD	
Modelling						
1	Demonstrated to learners how different tasks should be performed.	4.1	0.6	4.2	0.7	0.606
2	Explained to learners while performing a task which aspects were important and why.	4.4	0.8	4.3	0.6	0.683
3	Created sufficient opportunities for learners to observe him or her.	4.1	0.8	4.1	0.7	0.991
4	Was a role model for learners.	4.0	0.9	4.0	0.9	1.000
	Overall ratings on modelling	4.1	0.5	4.1	0.6	0.974
Coaching						
5	Observed learner(s) while he/she/they performed a task.	4.5	0.8	4.3	0.8	0.461
6	Provided learners with constructive and concrete feedback during or following direct observation.	4.3	0.6	4.2	0.8	0.667
7	Gave learner(s) a better insight into aspects of his/her/their performance that needed improvement.	4.3	0.8	4.3	0.8	0.791
	Overall ratings on coaching	4.3	0.5	4.2	0.6	0.695
Scaffolding						
8	Adjusted his/her teaching activities to learners' level of experience and competence.	4.2	0.8	4.2	0.7	0.858
9	Allowed learner(s) to perform tasks that fit his/her/their level of experience and competence.	4.1	0.8	3.9	0.9	0.579
10	Was supportive when learners experienced difficulties with a task.	4.1	0.7	4.2	0.6	0.613
11	Gradually decreased the amount of guidance in order to bolster learners' independence.	3.4	0.8	3.8	0.9	0.108
	Overall ratings on scaffolding	3.9	0.5	4.0	0.6	0.580
Articulation						
12	Asked learner(s) to explain his/her/their reasoning and arguments.	4.2	1.1	4.0	0.7	0.609
13	Alerted learner(s) to gaps in his/her/their knowledge and skills.	4.4	0.7	4.1	0.7	0.285
14	Asked questions to increase learners' understanding.	4.8	0.5	4.5	0.6	0.141
15	Stimulated learner(s) to ask questions to increase his/her/their understanding.	4.5	0.9	4.5	0.8	0.930
	Overall ratings on articulation	4.4	0.5	4.3	0.5	0.326
Reflection						
16	Stimulated learner(s) to think about his/her/their own strength and weaknesses.	3.9	0.7	4.1	1.0	0.351
17	Stimulated learner(s) to think about how to improve his/her/their own strengths and weaknesses.	4.0	0.6	4.1	0.9	0.684
	Overall ratings on reflection	3.9	0.6	4.1	0.9	0.479
Exploration						
18	Stimulated learner(s) to formulate his/her/their own goals	3.7	0.6	3.7	0.7	0.876
19	Stimulated learner(s) to achieve his/her/their own goals	4.0	0.7	4.1	0.8	0.665
20	Challenged learners to explore new tasks and possibilities.	4.2	0.7	4.2	0.8	0.865
	Overall ratings on exploration	3.9	0.4	4.0	0.7	0.859
General Learning Climate						
21	Established a safe-learning environment.	4.3	0.7	4.2	0.7	0.870
22	Showed an interest in learners.	4.5	0.5	4.3	0.7	0.515
23	Treated learners with respect.	4.4	0.7	4.6	0.6	0.267
24	Took enough time to supervise learners.	4.2	0.9	4.1	0.8	0.716
	Overall ratings on general learning climate.	4.3	0.5	4.3	0.6	0.957

Residents' true learning needs in facilitating teaching and learning in the clinical setting from the undergraduate medical students' perspective

Table 4.7 shows the undergraduate medical students' responses to the MCTQ after the conclusion of clinical bedside teaching with the residents. The teaching actions which most students agreed or strongly agreed that they experienced during the course of teaching were items in the domains of general learning climate (items 21-23), articulation (items 12-15), adjustment of teaching to students' level of experience and competence, and allowing students

to perform tasks that fit their level of experience and competence (items 8 and 9 respectively in the scaffolding domain).

Table 4.7. Students' Responses to the Maastricht Clinical Teaching Questionnaire

		Strongly disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly agree	Rated agree or strongly agree
The resident		N=20 (%)					
Modelling							
1	Demonstrated how different tasks should be performed.	7 (8.5)	16 (19.5)	17 (20.7)	29 (35.4)	13 (15.9)	42 (51.3)
2	Explained, while performing a task, which aspects were important and why.	2 (2.4)	19 (23.2)	11 (13.4)	29 (35.4)	21 (25.6)	50 (61.0)
3	Created sufficient opportunities for students to observe him or her.	7 (8.5)	17 (20.7)	23 (28.0)	26 (31.7)	9 (11.0)	35 (42.7)
4	Was a role model for students	5 (6.1)	13 (15.9)	28 (34.1)	30 (36.6)	6 (7.3)	36 (43.9)
Coaching							
5	Observed students while I was performing a task.	16 (19.5)	11 (13.4)	12 (14.6)	19 (23.2)	24 (29.3)	43 (52.5)
6	Provided students with constructive and concrete feedback during or following direct observation.	6 (7.3)	12 (14.6)	12 (14.6)	36 (43.9)	16 (19.5)	52 (63.4)
7	Gave students a better insight into aspects of my performance that needed improvement.	4 (4.9)	14 (17.1)	10 (12.2)	29 (35.4)	25 (30.5)	54 (65.9)
Scaffolding							
8	Adjusted his/her teaching activities to students' level of experience and competence.	0(0.0)	5 (6.1)	12 (14.6)	31 (37.8)	34 (41.5)	65 (79.3)
9	Allowed students' to perform tasks that fit my level of experience and competence.	8 (9.8)	13 (15.9)	10 (12.2)	28 (34.1)	23 (28.1)	51 (62.2)
10	Was supportive when students' experienced difficulties with a task.	5 (6.1)	14 (17.1)	15 (18.3)	30 (36.6)	18 (22.0)	48 (58.6)
11	Gradually decreased the amount of guidance in order to bolster students' independence.	9 (11.0)	19 (23.2)	23 (28.0)	22 (26.8)	9 (11.0)	31 (37.8)
Articulation							
12	Asked students to explain my reasoning and arguments.	5 (6.1)	12 (14.6)	14 (17.1)	26 (31.7)	25 (30.5)	51 (62.2)
13	Alerted students to gaps in my knowledge and skills.	2 (2.4)	12 (14.6)	13 (15.9)	32 (39.0)	23 (28.1)	55 (67.1)
14	Asked questions to increase students' understanding.	4 (4.9)	5 (6.1)	12 (14.6)	24 (29.3)	37 (45.1)	61 (74.4)
15	Stimulated students to ask questions to increase my understanding.	2 (2.4)	12 (14.6)	16 (19.5)	26 (31.7)	26 (31.7)	52 (63.4)
Reflection							
16	Stimulated students to think about my own strength and weaknesses.	7 (8.5)	16 (19.5)	21 (25.6)	27 (32.9)	11 (13.4)	38 (46.3)
17	Stimulated students to think about how to improve my own strengths and weaknesses.	5 (6.1)	21 (25.6)	17 (20.7)	30 (36.6)	9 (11.0)	39 (47.6)
Exploration							
18	Stimulated students to formulate my own goals	9 (11.0)	24 (29.3)	18 (22.0)	21 (25.6)	10 (12.2)	31 (37.8)
19	Stimulated students to achieve my own goals	7 (8.5)	24 (29.3)	20 (24.4)	25 (30.5)	6 (7.3)	31 (37.8)
20	Challenged students to explore new tasks and possibilities.	10 (12.2)	18 (22.0)	20 (24.4)	22 (26.8)	12 (14.6)	34 (41.4)
General Learning Climate							
21	Established a safe-learning environment	1 (1.2)	5 (6.1)	9 (11.0)	39 (47.6)	28 (34.1)	67 (81.9)
22	Showed an interest in students	1 (1.2)	6 (7.3)	13 (15.9)	36 (43.9)	26 (31.7)	62 (75.6)
23	Treated students with respect.	1 (1.2)	2 (2.4)	11 (13.4)	35 (42.7)	33 (40.2)	68 (82.9)
24	Took enough time to supervise students	4 (4.9)	12 (14.6)	18 (22.0)	32 (39.0)	16 (19.5)	48 (58.5)

The residents' true learning needs for facilitating teaching and learning in the clinical setting from the students' perspectives were determined by the completion of the MCTQ by undergraduate students who were recipients of the teaching. The residents' true learning needs from the students' perspective, were the teaching actions the students agreed or strongly agreed they least experienced during the course of teaching. As shown in Table 4.7, the teaching actions least experienced by the students were items in the domains of modelling (items 3 and

4), reflection (items 16 and 17), exploration (items 18-20), and in item 11 (gradually decreased the amount of guidance in order to bolster the students' independence).

Residents' true learning needs in facilitating teaching and learning in the clinical setting from the researcher's perspective

My assessment of residents' clinical bedside teaching is as shown in Table 4.8. The teaching actions most observed during the course of teaching were items in the domains of general learning climate (items 21-23), articulation (items 12, 14, and 15), and item 8 (residents adjusted their teachings to students' level of experience and competence) [rated to be observed in 95% of residents].

The residents' true learning needs for facilitating teaching and learning in the clinical setting from my perspectives were determined by the completion of the MCTQ by me. The residents' true learning needs from my perspective were the teaching actions that I agreed or strongly agreed were least observed during the course of teaching. The teaching actions least observed by me as shown in Table 4.8 were items in domains of modelling (items 2 and 3), coaching (items 5-7), reflection (items 16 and 17), and exploration (items 18-20).

Table 4.8. Researcher's Responses to the Maastricht Clinical Teaching Questionnaire

		Strongly disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly agree	Rated agree or strongly agree
The resident		N=20 (%)					
Modelling							
1	Demonstrated how different tasks should be performed.	0(0.0)	11 (55.0)	1 (5.0)	8 (40.0)	0(0.0)	8 (40.0)
2	Explained, while performing a task, which aspects were important and why.	0(0.0)	13 (65.0)	2 (10.0)	4 (20.0)	1(5.0)	5 (25.0)
3	Created sufficient opportunities for student(s) to observe him or her.	0(0.0)	14 (70.0)	2 (10.0)	4 (20.0)	0(0.0)	4 (20.0)
4	Was a role model for student(s)	0(0.0)	0(0.0)	5 (25.0)	15 (75.0)	0(0.0)	15 (75.0)
Coaching							
5	Observed the student(s) while s/he (they) was (were) performing a task.	2 (10.0)	9 (45.0)	1 (5.0)	8 (40.0)	0(0.0)	8 (40.0)
6	Provided the student(s) with constructive and concrete feedback during or following direct observation.	1 (5.0)	12 (60.0)	2 (10.0)	4 (20.0)	1 (5.0)	5 (25.0)
7	Gave the student(s) a better insight into aspects of his/her (their) performance that needed improvement.	1 (5.0)	9 (45.0)	2 (10.0)	8 (40.0)	0(0.0)	8 (40.0)
Scaffolding							
8	Adjusted his/her teaching activities to student's (students') level of experience and competence.	0(0.0)	0(0.0)	1 (5.0)	18 (90.0)	1 (5.0)	19 (95.0)
9	Allowed the student(s) to perform tasks that fit his/her (their) level of experience and competence.	1 (5.0)	6 (30.0)	0(0.0)	13 (65.0)	0(0.0)	13 (65.0)
10	Was supportive when the student(s) experienced difficulties with a task.	1 (5.0)	6 (30.0)	3 (13.0)	10 (50.0)	0(0.0)	10 (50.0)
11	Gradually decreased the amount of guidance in order to bolster the student's (students') independence.	1 (5.0)	13 (65.0)	3 (15.0)	3 (15.0)	0(0.0)	3 (15.0)
Articulation							
12	Asked the student(s) to explain his/her reasoning and arguments.	0(0.0)	6 (30.0)	0(0.0)	13 (65.0)	1(5.0)	14 (70.0)
13	Alerted the student(s) to gaps in his/her/their knowledge and skills.	0(0.0)	10 (50.0)	1 (5.0)	8 (40.0)	1 (5.0)	9 (45.0)
14	Asked questions to increase student's (students') understanding.	0(0.0)	2 (10.0)	2 (10.0)	15 (75.0)	1 (5.0)	16 (80.0)
15	Stimulated the student(s) to ask questions to increase his/her (their) understanding.	0(0.0)	5 (25.0)	1 (5.0)	12 (60.0)	2 (10.0)	14 (70.0)
Reflection							
16	Stimulated the student(s) to think about his/her (their) own strengths and weaknesses.	2 (10.0)	17 (85.0)	0(0.0)	1 (5.0)	0(0.0)	1 (5.0)
17	Stimulated the student(s) to think about how to improve his/her (their) own strengths and weaknesses.	3 (15.0)	16 (80.0)	0 (0.0)	1(5.0)	0(0.0)	1 (5.0)
Exploration							
18	Stimulated the student(s) to formulate his/her (their) own goals	13 (65.0)	6 (30.0)	0(0.0)	1(5.0)	0(0.0)	1 (5.0)
19	Stimulated the student(s) to achieve his/her (their) own goals	14 (70.0)	5 (25.0)	0(0.0)	1(5.0)	0(0.0)	1 (5.0)
20	Challenged the students to explore new tasks and possibilities.	3 (15.0)	10 (50.0)	0(0.0)	7 (35.0)	0(0.0)	7 (35.0)
General Learning Climate							
21	*Established a safe-learning environment.	0(0.0)	0(0.0)	0(0.0)	13 (65.0)	7 (35.0)	20 (100)
22	Showed an interest in the student s).	0(0.0)	0(0.0)	0(0.0)	18 (90.0)	2 (10.0)	20 (100)
23	Treated the student(s) with respect.	0(0.0)	0(0.0)	0(0.0)	15 (75.0)	5 (25.0)	20 (100)
24	Took enough time to supervise the student(s).	0(0.0)	5 (25.0)	2 (10.0)	10 (50.0)	3 (15.0)	13 (65.0)

Comparison of self-perceived and true learning needs of residents in facilitating teaching and learning in the clinical setting from the students' perspective

Differences in the self-perceived and true learning needs of residents in facilitating teaching and learning in the clinical setting from the students' perspective were determined by comparing the mean scores ± SD of the individual items and domains of the MCTQ completed by residents and students (see Table 4.9). With the exception of items 8 (adjusted his/her

teaching activities to students' level of experience and competence), 21 (the resident established a safe learning environment, and 23 (treated the students with respect), all the mean scores by the students' ratings were significantly lower ($p < 0.05$) than the self-assessment scores done by the residents. The highest domain mean scores from residents' self-assessment were in articulation (4.4 ± 0.5), coaching (4.3 ± 0.5), and general learning climate (4.3 ± 0.5) while the lowest mean scores were in exploration (3.9 ± 0.4), scaffolding (3.9 ± 0.5), and reflection domains (3.9 ± 0.6). The students rated the residents highest in general learning climate (3.9 ± 0.7), and articulation (3.8 ± 0.8) domains, and rated them lowest in reflection (3.2 ± 1.1) and exploration (3.0 ± 1.0) domains.

When Group A residents were asked to rate their overall performance on a scale of 1-10, 19 (95%) residents gave a score of ≥6. Twenty-six (31.7%) ratings by the students were scored ≤5, while 56 (68.3%) ratings were scored ≥6 on a scale of 1-10. The overall rating of the residents' teaching on a scale of 1-10 by students was significantly lower than self-rating by residents (6.0 ± 0.8 vs. 6.8 ± 0.7, $p = 0.02$) [Table 4.9].

Table 4.9. Comparison of mean ratings (standard deviations) on a Likert scale scores of self-assessment by the observed residents with assessment by the medical students

		Observed Residents (20 evaluations)		Students (82 evaluations)		p value
		Mean	SD	Mean	SD	
Modelling						
1	Demonstrated to learners how different tasks should be performed.	4.1	0.6	3.3	1.2	<0.001
2	Explained to learners while performing a task which aspects were important and why.	4.4	0.8	3.6	1.2	0.001
3	Created sufficient opportunities for learners to observe him or her.	4.1	0.8	3.2	1.1	<0.001
4	Was a role model for learners.	4.0	0.9	3.2	1.0	0.002
	Overall ratings on modelling	4.1	0.5	3.3	0.9	<0.001
Coaching						
5	Observed learner(s) while he/she/they performed a task.	4.5	0.8	3.3	1.5	<0.001
6	Provided learners with constructive and concrete feedback during or following direct observation.	4.3	0.6	3.5	1.2	<0.001
7	Gave learner(s) a better insight into aspects of his/her/their performance that needed improvement.	4.3	0.8	3.7	1.2	0.016
	Overall ratings on coaching	4.3	0.5	3.5	1.1	<0.001
Scaffolding						
8	Adjusted his/her teaching activities to learners' level of experience and competence.	4.2	0.8	4.1	0.9	0.805
9	Allowed learner(s) to perform tasks that fit his/her/their level of experience and competence.	4.1	0.8	3.6	1.3	0.020
10	Was supportive when learners experienced difficulties with a task.	4.1	0.7	3.5	1.2	0.007
11	Gradually decreased the amount of guidance in order to bolster learners' independence.	3.4	0.8	3.0	1.2	0.265
	Overall ratings on scaffolding	3.9	0.5	3.6	0.9	0.029
Articulation						
12	Asked learner(s) to explain his/her/their reasoning and arguments.	4.2	1.1	3.7	1.2	0.105
13	Alerted learner(s) to gaps in his/her/their knowledge and skills.	4.4	0.7	3.8	1.1	0.003
14	Asked questions to increase learners' understanding.	4.8	0.5	4.0	1.1	<0.001
15	Stimulated learner(s) to ask questions to increase his/her/their understanding.	4.5	0.9	3.8	1.1	0.012
	Overall ratings on articulation	4.4	0.5	3.8	0.8	<0.001
Reflection						
16	Stimulated learner(s) to think about his/her/their own strength and weaknesses.	3.9	0.7	3.2	1.2	0.003
17	Stimulated learner(s) to think about how to improve his/her/their own strengths and weaknesses.	4.0	0.6	3.2	1.1	<0.001
	Overall ratings on reflection	3.9	0.6	3.2	1.1	<0.001
Exploration						
18	Stimulated learner(s) to formulate his/her/their own goals	3.7	0.6	3.0	1.2	<0.001
19	Stimulated learner(s) to achieve his/her/their own goals	4.0	0.7	3.0	1.1	<0.001
20	Challenged learners to explore new tasks and possibilities.	4.2	0.7	3.1	1.3	<0.001
	Overall ratings on exploration	3.9	0.4	3.0	1.0	<0.001
General Learning Climate						
21	Established a safe-learning environment.	4.3	0.7	4.1	0.9	0.292
22	Showed an interest in learners.	4.5	0.5	4.0	0.9	0.032
23	Treated learners with respect.	4.4	0.7	4.2	0.8	0.290
24	Took enough time to supervise learners.	4.2	0.9	3.5	1.1	0.024
	Overall ratings on general learning climate.	4.3	0.5	3.9	0.7	0.03
	Overall ratio of the teacher on a scale of 1-10	6.8	0.7	6.0	1.4	0.002

Comparison of self-perceived and true learning needs of residents in facilitating teaching and learning in the clinical setting from the researcher's perspective

Differences in the self-perceived learning needs of residents and true learning needs from my observation were determined by comparing the mean scores ± SD of the individual items and domains of the MCTQ completed by residents and I (see Table 4.10). All the mean scores of MCTQ items by my ratings were significantly lower than self-assessment mean scores by

residents except for items 4 (resident was a role model for learners), 8 (residents adjusted their teaching activities to learners' level of experience and competence), 21 (established a safe-learning environment), 22 (residents treated learners with respect), and 24 (residents took enough time to supervise the learners).

Table 4.10. Comparison of mean ratings and standard deviations on a Likert scale of self-assessment by the observed residents with the assessment by the researcher

		Observed Residents (20 evaluations)		Researcher (20 evaluations)		p value
		Mean	SD	Mean	SD	
Modelling						
1	Demonstrated to learners how different tasks should be performed.	4.1	0.6	2.9	1.0	<0.001
2	Explained to learners while performing a task which aspects were important and why.	4.4	0.8	2.7	1.0	<0.001
3	Created sufficient opportunities for learners to observe him or her.	4.1	0.8	2.5	0.8	<0.001
4	Was a role model for learners.	4.0	0.9	3.8	0.4	0.282
	Overall ratings on modelling	4.1	0.5	2.9	0.6	<0.001
Coaching						
5	Observed learner(s) while he/she/they performed a task.	4.5	0.8	2.8	1.1	<0.001
6	Provided learners with constructive and concrete feedback during or following direct observation.	4.3	0.6	2.6	1.0	<0.001
7	Gave learner(s) a better insight into aspects of his/her/their performance that needed improvement.	4.3	0.8	2.9	1.0	<0.001
	Overall ratings on coaching	4.3	0.5	2.7	0.9	<0.001
Scaffolding						
8	Adjusted his/her teaching activities to learners' level of experience and competence.	4.2	0.8	4.0	0.3	0.293
9	Allowed learner(s) to perform tasks that fit his/her/their level of experience and competence.	4.1	0.8	3.3	1.1	0.007
10	Was supportive when learners experienced difficulties with a task.	4.1	0.7	3.1	1.0	0.001
11	Gradually decreased the amount of guidance in order to bolster learners' independence.	3.4	0.8	2.4	0.8	0.001
	Overall ratings on scaffolding	3.9	0.5	3.2	0.6	<0.001
Articulation						
12	Asked learner(s) to explain his/her/their reasoning and arguments.	4.2	1.1	3.5	1.0	0.041
13	Alerted learner(s) to gaps in his/her/their knowledge and skills.	4.4	0.7	3.0	1.1	<0.001
14	Asked questions to increase learners' understanding.	4.8	0.5	3.8	0.7	<0.001
15	Stimulated learner(s) to ask questions to increase his/her/their understanding.	4.5	0.9	3.6	1.0	0.005
	Overall ratings on articulation	4.4	0.5	3.4	0.7	<0.001
Reflection						
16	Stimulated learner(s) to think about his/her/their own strength and weaknesses.	3.9	0.7	2.0	0.5	<0.001
17	Stimulated learner(s) to think about how to improve his/her/their own strengths and weaknesses.	4.0	0.6	2.0	0.6	<0.001
	Overall ratings on reflection	3.9	0.6	2.0	0.6	<0.001
Exploration						
18	Stimulated learner(s) to formulate his/her/their own goals	3.7	0.6	1.4	0.5	<0.001
19	Stimulated learner(s) to achieve his/her/their own goals	4.0	0.7	1.3	0.5	<0.001
20	Challenged learners to explore new tasks and possibilities.	4.2	0.7	2.6	1.1	<0.001
	Overall ratings on exploration	3.9	0.4	1.7	0.6	<0.001
General Learning Climate						
21	Established a safe-learning environment.	4.3	0.7	4.4	0.5	0.786
22	Showed an interest in learners.	4.5	0.5	4.1	0.3	0.013
23	Treated learners with respect.	4.4	0.7	4.3	0.4	0.415
24	Took enough time to supervise learners.	4.2	0.9	3.6	1.0	0.057
	Overall ratings on general learning climate.	4.3	0.5	4.1	0.5	0.089
	Total Score	4.1	0.3	2.9	0.5	<0.001
	Overall ratio of the teacher on a scale of 1-10	6.8	0.7	6.0	0.8	0.002

The highest mean score by my assessment is in the general learning climate domain (4.1 ± 0.5) while the lowest mean scores were in the exploration (1.7 ± 0.6), and reflection (2.0 ± 0.6)

domains. The composite mean domain scores from my rating were statistically significantly lower than mean scores by self-assessment of residents in all domains ($p < 0.05$) except for the general learning climate domain ($p=0.089$).

Seven (35%) residents were scored 5, and 13 (65%) were scored ≥6 on a scale of 1-10 by me (range 5-7). The overall rating of the residents' teaching on a scale of 1-10 by me is significantly lower than self-rating by residents (6.0 ± 1.4 vs. 6.8 ± 0.7, $p = 0.002$) [Table 4.10].

Differences in true learning needs of residents for facilitating teaching and learning in the clinical setting as perceived by the undergraduate students and the researcher

Differences in true learning needs of residents for facilitating teaching and learning in the clinical setting as perceived by the undergraduate students and I were explored by comparing the mean scores ± SD of the individual items and domains of the MCTQ completed by the students and I (see Table 4.11). The mean scores from my rating were generally lower for items 1-20, and slightly higher for items 21-24 when compared to the rating done by students. However, these differences only reach statistical significance for 11 items (items 2, 3, 4, 6, 7, 11, 13, 16, 17, 18 and 19). Interestingly, the overall ratings of the residents' teaching by the students and I (on a scale of 1-10) were similar (6.0 ± 0.8 vs. 6.0 ± 1.4, $p = 0.803$).

Table 4.11. Comparison of mean ratings and standard deviations on a Likert scale of assessment of residents' clinical teaching by students with assessment by the researcher

		Students (82 evaluations)		Researcher (20 evaluations)		p value
		Mean	SD	Mean	SD	
Modelling						
11	Demonstrated to learners how different tasks should be performed.	3.3	1.2	2.9	1.0	0.121
2	Explained to learners while performing a task which aspects were important and why.	3.6	1.2	2.7	1.0	0.001
3	Created sufficient opportunities for learners to observe him or her.	3.2	1.1	2.5	0.8	0.017
4	Was a role model for learners.	3.2	1.0	3.8	0.4	0.001
	Overall ratings on modelling	3.3	0.9	2.9	0.6	0.024
Coaching						
5	Observed learner(s) while he/she/they performed a task.	3.3	1.5	2.8	1.1	0.133
6	Provided learners with constructive and concrete feedback during or following direct observation.	3.5	1.2	2.6	1.0	0.002
7	Gave learner(s) a better insight into aspects of his/her/their performance that needed improvement.	3.7	1.2	2.9	1.0	0.005
	Overall ratings on coaching	3.5	1.1	2.7	0.9	0.005
Scaffolding						
8	Adjusted his/her teaching activities to learners' level of experience and competence.	4.1	0.9	4.0	0.3	0.234
9	Allowed learner(s) to perform tasks that fit his/her/their level of experience and competence.	3.6	1.3	3.3	1.1	0.349
10	Was supportive when learners experienced difficulties with a task.	3.5	1.2	3.1	1.0	0.157
11	Gradually decreased the amount of guidance in order to bolster learners' independence.	3.0	1.2	2.4	0.8	0.025
	Overall ratings on scaffolding	3.6	0.9	3.2	0.6	0.077
Articulation						
12	Asked learner(s) to explain his/her/their reasoning and arguments.	3.7	1.2	3.5	1.0	0.484
13	Alerted learner(s) to gaps in his/her/their knowledge and skills.	3.8	1.1	3.0	1.1	0.007
14	Asked questions to increase learners' understanding.	4.0	1.1	3.8	0.7	0.166
15	Stimulated learner(s) to ask questions to increase his/her/their understanding.	3.8	1.1	3.6	1.0	0.456
	Overall ratings on articulation	3.8	0.8	3.4	0.7	0.073
Reflection						
16	Stimulated learner(s) to think about his/her/their own strength and weaknesses.	3.2	1.2	2.0	0.5	<0.001
17	Stimulated learner(s) to think about how to improve his/her/their own strengths and weaknesses.	3.2	1.1	2.0	0.6	<0.001
	Overall ratings on reflection	3.2	1.1	2.0	0.6	<0.001
Exploration						
18	Stimulated learner(s) to formulate his/her/their own goals	3.0	1.2	1.4	0.5	<0.001
19	Stimulated learner(s) to achieve his/her/their own goals	3.0	1.1	1.3	0.5	<0.001
20	Challenged learners to explore new tasks and possibilities.	3.1	1.3	2.6	1.1	0.078
	Overall ratings on exploration	3.0	1.0	1.7	0.6	<0.001
General Learning Climate						
21	Established a safe-learning environment.	4.1	0.9	4.4	0.5	0.188
22	Showed an interest in learners.	4.0	0.9	4.1	0.3	0.321
23	Treated learners with respect.	4.2	0.8	4.3	0.4	0.625
24	Took enough time to supervise learners.	3.5	1.1	3.6	1.0	0.961
	Overall ratings on general learning climate.	3.9	0.7	4.1	0.5	0.367
	Total Score	3.5	0.7	2.9	0.5	<0.001
	Overall rating of the resident on a scale of 1 - 10	6.0	1.4	6.0	0.8	0.803

Differences in the true learning needs of junior and senior residents for facilitating teaching and learning in the clinical setting

Differences in the true learning needs of the junior and senior residents for facilitating teaching and learning in the clinical setting from the students' perspective were determined by comparing the mean scores ± SD of the individual items and domains of the MCTQ completed by the students (see Table 4.12). The students provided 46 ratings on 11 junior residents' teachings, and 36 ratings on 9 senior residents' teachings (Table 4.12). With the exception of

item 5 (resident observed learners while they performed a task) with statistically significantly higher mean score rating for junior residents when compared to senior residents (3.6 ± 1.4 vs. 2.9 ± 1.6, p = 0.044), mean scores in the other 23 items were similar. The mean scores in all the domains were comparable for junior and senior residents. The difference in the overall rating (on a scale of 1-10) of the junior and senior residents' clinical bedside teaching by students was not statistically significant (6.1 ± 1.1 vs. 6.0 ± 1.7, p = 0.868).

Table 4.12. Comparison of mean ratings and standard deviations on a Likert scale of students' assessment of clinical teaching of residents according to the residents' status

		Observed Junior Residents (46 ratings)		Observed Senior residents (36 ratings)		p value
		Mean	SD	Mean	SD	
Modelling						
1	Demonstrated to learners how different tasks should be performed.	3.3	1.1	3.3	1.3	0.858
2	Explained to learners while performing a task which aspects were important and why.	3.7	1.1	3.5	1.3	0.444
3	Created sufficient opportunities for learners to observe him or her.	3.3	1.0	3.0	1.3	0.361
4	Was a role model for learners.	3.1	1.0	3.4	0.9	0.143
	Overall ratings on modelling	3.3	0.8	3.3	1.0	0.850
Coaching						
5	Observed learner(s) while he/she/they performed a task.	3.6	1.4	2.9	1.6	0.044
6	Provided learners with constructive and concrete feedback during or following direct observation.	3.7	0.9	3.3	1.3	0.093
7	Gave learner(s) a better insight into aspects of his/her/their performance that needed improvement.	3.8	1.1	3.6	1.3	0.583
	Overall ratings on coaching	3.7	0.9	3.3	1.3	0.099
Scaffolding						
8	Adjusted his/her teaching activities to learners' level of experience and competence.	4.0	0.8	4.3	1.0	0.239
9	Allowed learner(s) to perform tasks that fit his/her/their level of experience and competence.	3.6	1.1	3.5	1.4	0.899
10	Was supportive when learners experienced difficulties with a task.	3.3	1.2	3.7	1.2	0.158
11	Gradually decreased the amount of guidance in order to bolster learners' independence.	3.1	1.1	3.0	1.3	0.806
	Overall ratings on scaffolding	3.5	0.8	3.6	1.0	0.523
Articulation						
12	Asked learner(s) to explain his/her/their reasoning and arguments.	3.5	1.1	3.9	1.4	0.134
13	Alerted learner(s) to gaps in his/her/their knowledge and skills.	3.6	1.0	3.9	1.2	0.170
14	Asked questions to increase learners' understanding.	4.0	1.1	4.1	1.2	0.744
15	Stimulated learner(s) to ask questions to increase his/her/their understanding.	3.7	0.7	3.9	0.9	0.257
	Overall ratings on articulation	3.7	0.7	3.9	0.9	0.130
Reflection						
16	Stimulated learner(s) to think about his/her/their own strength and weaknesses.	3.1	1.2	3.4	1.0	0.146
17	Stimulated learner(s) to think about how to improve his/her/their own strengths and weaknesses.	3.1	1.1	3.3	1.1	0.375
	Overall ratings on reflection	3.1	1.1	3.4	1.0	0.217
Exploration						
18	Stimulated learner(s) to formulate his/her/their own goals	2.9	1.2	3.0	1.2	0.660
19	Stimulated learner(s) to achieve his/her/their own goals	2.8	1.1	3.2	1.1	0.139
20	Challenged learners to explore new tasks and possibilities.	3.2	1.2	3.0	1.3	0.658
	Overall ratings on exploration	3.0	1.0	3.1	1.1	0.602
General Learning Climate						
21	Established a safe-learning environment.	4.1	0.9	4.0	0.9	0.518
22	Showed an interest in learners.	3.8	1.0	4.2	0.8	0.035
23	Treated learners with respect.	4.2	0.8	4.2	0.9	0.914
24	Took enough time to supervise learners.	3.6	1.1	3.4	1.1	0.511
	Overall ratings on general learning climate.	3.9	0.7	4.0	0.7	0.803
	Overall rating of teaching on a scale of 1 - 10	6.1	1.1	6.0	1.7	0.868

Similarly, the differences in the true learning needs of junior and senior residents for facilitating teaching and learning in the clinical setting from my perspective were determined by comparing the mean scores ± SD of the individual items and domains of the MCTQ completed by me (Table 4.13).

Table 4.13. Comparison of mean ratings and standard deviations on a Likert scale of the researcher's assessment of clinical teaching of the residents according to the residents' status

		Observed Junior Residents (11 evaluations)		Observed Senior residents (9 evaluations)		p value
		Mean	SD	Mean	SD	
Modelling						
1	Demonstrated to learners how different tasks should be performed.	2.9	1.0	2.8	1.0	0.776
2	Explained to learners while performing a task which aspects were important and why.	2.6	0.9	2.7	1.1	0.948
3	Created sufficient opportunities for learners to observe him or her.	2.4	0.8	2.7	0.9	0.430
4	Was a role model for learners.	3.7	0.5	3.8	0.4	0.808
	Overall ratings on modelling	2.9	0.6	3.0	0.6	0.817
Coaching						
5	Observed learner(s) while he/she/they performed a task.	3.2	1.0	2.2	1.1	0.053
6	Provided learners with constructive and concrete feedback during or following direct observation.	2.6	0.9	2.6	1.2	0.869
7	Gave learner(s) a better insight into aspects of his/her/their performance that needed improvement.	2.9	0.9	2.8	1.2	0.787
	Overall ratings on coaching	2.9	0.8	2.5	0.9	0.329
Scaffolding						
8	Adjusted his/her teaching activities to learners' level of experience and competence.	3.9	0.3	4.1	0.3	0.172
9	Allowed learner(s) to perform tasks that fit his/her/their level of experience and competence.	3.1	1.0	3.4	1.1	0.477
10	Was supportive when learners experienced difficulties with a task.	3.0	1.0	3.2	1.1	0.641
11	Gradually decreased the amount of guidance in order to bolster learners' independence.	2.3	0.6	2.6	1.0	0.458
	Overall ratings on scaffolding	3.1	0.5	3.3	0.8	0.349
Articulation						
12	Asked learner(s) to explain his/her/their reasoning and arguments.	3.6	0.8	3.2	1.2	0.393
13	Alerted learner(s) to gaps in his/her/their knowledge and skills.	2.8	1.0	3.2	1.2	0.418
14	Asked questions to increase learners' understanding.	3.5	0.8	4.0	0.5	0.146
15	Stimulated learner(s) to ask questions to increase his/her/their understanding.	3.4	1.1	3.8	0.8	0.370
	Overall ratings on articulation	3.3	0.6	3.6	0.8	0.519
Reflection						
16	Stimulated learner(s) to think about his/her/their own strength and weaknesses.	1.9	0.3	2.1	0.8	0.439
17	Stimulated learner(s) to think about how to improve his/her/their own strengths and weaknesses.	1.8	0.4	2.1	0.8	0.293
	Overall ratings on reflection	1.9	0.3	2.1	0.8	0.350
Exploration						
18	Stimulated learner(s) to formulate his/her/their own goals	1.4	0.5	1.3	0.5	0.895
19	Stimulated learner(s) to achieve his/her/their own goals	1.2	0.5	1.3	0.5	0.783
20	Challenged learners to explore new tasks and possibilities.	2.7	1.3	2.3	1.0	0.459
	Overall ratings on exploration	1.8	0.6	1.7	0.6	0.669
General Learning Climate						
21	Established a safe-learning environment.	4.3	0.5	4.4	0.5	0.450
22	Showed an interest in learners.	4.1	0.3	4.1	0.4	0.888
23	Treated learners with respect.	4.2	0.4	4.3	0.5	0.463
24	Took enough time to supervise learners.	3.4	1.0	3.8	1.1	0.395
	Overall ratings on general learning climate.	4.0	0.4	4.2	0.5	0.379
	Overall rating of teaching on a scale of 10	5.7	0.8	6.2	0.8	0.189

The comparison of my ratings of the observed teaching behaviours of residents by their status did not show any statistically significant difference in the scores of the 2 groups of residents (see Table 4.13). However, junior residents observed the medical students more than the senior residents when they perform tasks i.e. eliciting additional history or physical examination, during the teaching interactions (item 5), and the difference in this teaching behaviour approached significance (3.2 ± 1.0 vs. 2.2 ± 1.1, p=0.053). The difference in the overall rating (on a scale of 1-10) of the junior and senior residents' clinical bedside teaching by me was not statistically significant (6.2 ± 0.8 vs. 5.7 ± 0.8, p=0.189).

Self-perceived importance of topics to be included in a Residents-as-Teachers Curriculum

Residents were asked to rank various topics to be included in a RaT programme from a menu of options according to self-perceived importance. Each topic was ranked from 1 (most important) to 19 (least important) by the residents according to the self-perceived importance of the topics. Residents ranked communication skills, leadership, teaching of procedural skills, bedside teaching and evidence-based medicine as highly-important topics (see Table 4.14). The least important topics according to residents' ranking were conflict management, time management, and burnout syndrome.

*Table 4.14. Ranking by the residents of the different topics considered to be important in a residents-as-teachers programme

Ranking	Topics	Frequency of ranking (N=39)	Percentage of ranking (%)
1	Communication skills	12	30.8
2	Leadership	8	20.5
3	Teaching procedural skills	6	15.4
4	Bedside teaching	6	15.4
5	Evidence – based medicine	6	15.4
6	Learning theories	5	12.8
7	Learning styles	5	12.8
8	Assessment methods	5	12.8
9	Giving feedback	5	12.8
10	Clinical reasoning	5	12.8
11	History and physical examination	4	10.3
12	Ethics	4	10.3
13	Motivational strategies	3	7.7
14	Role modelling	3	7.7
15	Reflective practice	6	15.4
16	Conflict management	3	7.7
17	Time management	4	10.3
18	Burnout syndrome	19	48.7
19	Others – mentoring, illustration	2	5.2

*Note: Each topic was ranked from 1 (most important) to 19 (least important) by the residents according to the self-perceived importance of the topics. The highest frequency of ranking of these topics was then used to arrange the topics in descending order of importance. As shown in Table 4.14, 12 residents out of 39 (30.8%) ranked communication skills as 1, while 19 out of 39 residents (48.7%) ranked burnout syndrome as 18.

Residents' preferred methods of instruction for a Residents-as-Teacher programme

The teaching methods in descending order of preference by residents when asked to rank from 1 to 5 the preferred teaching methods to be employed if they were to participate in a RaT programme were: (1) interactive sessions with teachers (31, 79.5%), (2) working in small group with a facilitator (28, 71.8%), (3) printed materials for self-study and programmed assignments (19, 4.7%), (4) online work in small group (12, 30.8%), and (5) didactic material on a website for online individual learning (14, 35.9%).

Mean scores, standard deviations and Cronbach's alpha (internal consistency) for the seven domains of the MCTQ

Table 4.15 shows the mean scores, standard deviations and Cronbach's alpha (internal consistency) for the seven domains of the MCTQ and their correlation with the overall judgement of clinical teaching of residents (10-point scale) by students' and me. For the undergraduate medical students, the alpha score for all the domains was above 0.7 except articulation (0.69). From my ratings, the Cronbach's alpha was ≥0.7 for five factors (i.e.

coaching, articulation, reflection, exploration, and general learning climate), and slightly less than 0.7 for modelling (0.641) and scaffolding (0.673). These findings indicate good internal consistency of the MCTQ as an instrument for assessing bedside clinical teaching of our residents.

Table 4.15. Mean scores, standard deviations and Cronbach's alpha (internal consistency) for the seven domains of the MCTQ

	Students			Researcher		
Factors	**Mean score ± SD**	**Cronbach's alpha**	**Correlation with overall judgement of the resident**	**Mean score ± SD**	**Cronbach's alpha**	**Correlation with overall judgement of the resident**
Modelling	3.3 ±0.9	0.804	0.529**	2.9 ± 0.6	0.641	0.605**
Coaching	3.5 ± 1.1	0.817	0.562**	2.7 ± 0.9	0.732	0.555**
Scaffolding	3.6 ± 0.9	0.763	0.588**	3.2 ± 0.6	0.673	0.658**
Articulation	3.8 ± 0.8	0.690	0.596**	3.4 ± 0.7	0.737	0.717**
Reflection	3.2 ± 1.1	0.897	0.588**	2.0 ± 0.6	0.962	0.432
Exploration	3.0 ± 1.0	0.833	0.591**	1.7 ± 0.6	0.700	0.614**
GLC	3.9 ± 0.7	0.774	0.468**	4.1 ± 0.5	0.704	0.685**

GLC – General learning climate, **Significant at the 0.01 level (two-tailed)

CHAPTER 5: DISCUSSION

We conducted a needs assessment of our residents for facilitating teaching and learning in the clinical setting in a bid to identify the strengths and gaps in their teaching skills with the

ultimate aim of using these findings to design a context-specific RaT programme for the institution. The self-perceived learning needs identified by our residents were their inability to reduce the support given to the students during the teaching session in order for the students to gradually achieve independence (autonomy), and their failure to encourage the students to formulate their learning goals. Our residents' true learning needs for facilitating teaching and learning in clinical setting were in the domains of modelling, coaching, reflection, and exploration of the cognitive apprenticeship model. In addition, residents ranked communication skills, leadership skills, teaching procedural skills, and bedside teaching as leading topics to be included in a RaT programme, and interactive sessions with teachers and working in small groups as the preferred method of delivery of RaT.

Unlike other needs assessment studies which investigated specific departments (Ahn et al., 2017; D'Silva et al., 2016), this study investigated residents in multiple departments. This was necessary to have a reasonable sample size, and to generate data from residents in various departments engaged in clinical teaching of undergraduate medical students. The participation rate by residents in this study was 78%. This rate is slightly higher than the 68% (17 of 25 residents) reported by D'Silva et al. (2016) in a needs assessment study of Geriatric Medicine residents in Canada, and the 65.7% in another needs assessment survey at the Faculty of Medicine, National Autonomous University of Mexico (Sanchez-Mendiola et al., 2010). This study is similar in design to the study by Sanchez-Mendiola et al. (2010) in the sense that it involved multiple disciplines. Our study, however, differs from these two other studies in that it is limited to a single institution while the study done by D'Silva et al. (2016) was based on a national survey of all the Geriatric Medicine residents in Canada (n=25). Another difference is that the study done by the Faculty of Medicine, National Autonomous University of Mexico, reported on 5,053 residents which made up more than half of the total residents in Mexico (Sanchez-Mendiola et al., 2010).

Our residents' response rate in this study falls within the reported response rates of 9-94% from studies that have investigated residents' perception of teaching (du Toit-Prinsloo et al., 2016; Owolabi et al., 2014; Wachtel et al., 2013). Owolabi et al. (2014) from Nigeria reported a response rate of 94% in a study that evaluated the teaching skills of medical residents. Wachtel et al. (2013) reported a response rate of 78% in 47 Emergency Medicine residents who took part in a study involving residents' perceptions before and after receiving instructions in clinical teaching. The lowest response rate of 9% was reported by du Toit-Prinsloo and colleagues (2016) in a pilot study that investigated the perception and attitudes of residents

with regard to their roles as teachers at the Faculty of Health Sciences, University of Pretoria, South Africa. This study thus adds to our understanding of the learning needs of residents in facilitating teaching in that it uses methods recognised by others, includes a variety of disciplines, and it has an adequate sample of current residents at our institution.

Self-directed lifelong learning requires the ability to determine one's learning needs. Determination of learning needs helps the individual to set appropriate learning goals in order to improve his/her performance, and to set realistic expectations of himself/herself (Eva & Regehr, 2005). The successful planning and implementation of an educational intervention such as a RaT programme to improve the teaching ability of our residents requires a needs assessment involving all the relevant stakeholders. A needs assessment ensures that the curricular objectives are relevant to the local setting, achievable with the available resources, and appropriate to the residents' learning needs (Kern et al., 1998).

There are two self-perceived learning needs of our residents for facilitating learning in the clinical setting that were identified from this study. These were the inability of residents to gradually reduce the guidance given to medical students and allow the students' some degree of autonomy, and the failure on the part of residents to stimulate the students to formulate learning goals. Our findings are similar to reports from other studies that documented that students were not actively involved in the formulation of learning goals (Boerboom et al., 2011; Stalmeijer et al., 2010). Boerboom and colleagues (2011) in the validation study of the MCTQ instrument in veterinary medicine education documented the lowest score in the formulation of learning goals (2.90±0.49).

Also, in the validation study of the MCTQ by Stalmeijer et al. (2010), students rated clinical teachers lowest on the item "encourage me to formulate learning goal" (3.5±0.52). To the best of my knowledge, residents in their interactions with consultants were hardly asked to formulate their own learning goals, and therefore may be unaware of the importance of engaging learners to formulate their own learning goals. Learning goals can be likened to a "roadmap" which allows students to negotiate the learning journey, and it gives the students a sense of accomplishment at the end of the teaching session. We did not find any difference in the self-assessment of observed and unobserved residents. This indicates that the self-perceived learning needs of these two groups of residents are similar.

Our residents' learning needs for facilitating teaching and learning in clinical setting determined by direct observation of bedside teaching, showed that items related to modelling,

reflection, and exploration were scored relatively low by the undergraduate medical students and I. In addition to these, I also rated the residents low in the items related to coaching. The implication of these findings is that our residents did not seem to be devoting enough time to demonstrate different tasks of the clinical work to the students in order for the students to appreciate the cognitive process involved in accomplishing the task. This may be because residents themselves did not frequently experience this teaching action during the course of their training.

Students were not given new tasks or assignments related to the teaching session to improve their comprehension (exploration, items 18-20), and were not consciously stimulated to think about (reflect) and improve on their strengths and weaknesses (reflection). Furthermore, I also observed that residents did not frequently observe students during the teaching interaction (i.e. ask the students to take additional history in their presence, or clarify issues, or conduct general examination in their presence to identify the weaknesses/deficiencies in examination skills), and provided minimal guidance, constructive feedback, and insights into students' performance that needed to be improved (coaching, items 5-7).

Various reports have shown that feedback is not routinely given to students during teaching-learning encounters (Kluger & Van Dijk, 2010). In the cases where feedback is given, it tends to dwell on students' weaknesses, it is too generalised for students to make use to improve their performance. The feedback also does not particularly dwell on non-cognitive attributes such as effective communication skills, team work and reflection (Mubuuke et al., 2016; Mubuuke et al., 2017). For effective learning to occur, feedback needs to be timely, focused, and include both the strengths and weaknesses of the performer (Kluger & Van Dijk, 2010; Van Dijk & Kluger, 2011).

Residents in this study did not frequently encourage students to reflect on their performance. Reflection provides students with an opportunity to personally interpret and integrate the learning experience from the encounter into existing knowledge structures or schema in order to expand their knowledge or acquire new knowledge (Sandars, 2009). Reflection thus promotes self-regulated learning and fosters a deep approach to learning.

Our findings were similar to findings by Katz et al. (2003) who used an 18-item questionnaire to assess the skills of residents in Obstetrics & Gynaecology in facilitating learning in the ambulatory setting. Items relating to orientation and feedback from residents to students were less frequently observed during these teaching interactions. The differences between Katz et

al. (2003) and our study relates to the setting and the identification of teaching behaviours. Our study was carried out in an inpatient setting compared to ambulatory setting of Katz's study. The teaching behaviours were recorded as either absent or present while in our study items were graded using a 5 point Likert scale.

The residents were rated quite high on the items related to general learning climate, articulation and adjusting teaching to learners' level of experience (item 18). These teaching behaviours constitute the strengths of our residents in facilitating teaching and learning in the clinical setting. Creating a safe, non-threatening, respectful and friendly environment has been shown to facilitate active learning during interactions. Residents frequently asked students to explain their rationale and reasoning during the encounters, and also provided the students with opportunities to ask them questions. These behaviours help to improve the understanding of the students on the subjects or competencies under discussion.

The identified strengths of our residents in facilitating teaching and learning in the clinical setting can be explained by the *cognitive* and *social congruence* of the residents to the students. Residents are closer in age and stage of learning to medical students when compared to consultants, and can thus function as a 'near-peer teacher" with knowledge being actively constructed through social interactions by residents and students in an educational environment. Also, residents are closer to medical students' zone of proximal development, defined as the distance between pre-existing knowledge and level of potential development, and as such understand the learning needs of medical students which help them to pitch their teaching at a level that can easily be understood by the students (*cognitive congruence*) (Lockspeiser et al., 2008; Turner et al., 2014; Yew & Young, 2014). The closeness of the residents to students' zone of proximal development helps to foster a deeper, more meaningful, and non-threatening relationship between the residents and medical students. This encourages the students to admit their ignorance, and encourages unhindered exchange of ideas during the teaching interaction (*social congruence*). (Lockspeiser et al., 2008; Yew &Young, 2014)

Although more senior residents rated themselves as being fully competent to teach when compared to junior residents (54% vs. 27%), comparison of the observed behaviours by the students and I as identified by the scores in the six domains of the MCTQ instrument did not show any significant difference according to residents' status (junior or senior). These findings indicate that learning needs of our residents with regards to facilitating learning in the clinical setting are the same – irrespective of the status of the residents. Studies have shown that

residents' teaching skills did not improve in relation to their clinical competence (Edwards et al., 1988). Also, the duration of residency or residency status had no significant impact on residents' clinical teaching skills or the students' ratings of residents as teachers (Irby et al.,1987; Katz et al., 2003; Owolabi et al., 2014). While it is true that senior residents may have more knowledge about a particular specialty or subject matter, and have been recipients of more teachings compared to junior residents, this does not necessarily make senior residents better teachers. This is because teaching as a profession requires basic understanding of the underpinning educational principles and proven techniques. Thus, effective teaching depends not only on the sound knowledge of the subject matter or content, but also on the ability to apply sound teaching theories and techniques in diverse settings, as well as to have an appropriate attitude and passion for teaching (Raman & Leinster, 2008).

Studies on the accuracy of self–assessment as a measure of competence have yielded mixed results (Colthart et al., 2008; Davis et al., 2006). Many researchers have pointed out the methodological flaws in direct comparison of ratings of self-assessment with ratings obtained from the measure of performance (Ward et al., 2002). These flaws include the use of objective assessment by experts as the '*gold standard*' of performance, differential and inconsistent use of the assessment scales by the participants, and problems associated with group level analysis (Ward et al., 2002). Ward and colleagues (2002) argue that expert judgement may not necessarily serve as the 'gold standard' in all aspects of clinical competence, particularly in non-cognitive domains. However, ratings of experts have been found to be more consistent when short, structured, and simple tasks are evaluated (Ward et al, 2002). There are suggestions that assessment by experts tends to focus on cognitive domains, while students tend to emphasize non-cognitive aspects of the performance (Donnelly & Woolliscroft, 1989). Our approach of using the same structured tool provides us with a fuller view of the non-cognitive and the cognitive abilities of our residents' abilities in facilitating teaching and learning in the clinical setting.

Studies have shown an inverse correlation between competence and self-assessment with the least competent overrating themselves, and the most competent underrating themselves (Colthart et al., 2008; Davis et al., 2006; Hodges et al., 2001; Kruger & Dunning, 1999). Kruger & Dunning (1999) argue that the skills required to develop competency in a particular domain are also often required to assess competence in that domain. This poor ability to self-assess by the least incompetent people probably derives from their lack of metacognitive skills. According to Dunning:

> "--people misjudge their incompetence not because of a lack of honesty with themselves but rather because of a lack of the essential cognitive tools needed to provide correct self-judgement" (Dunning 2006, p.602).

Despite this problem with self-assessment, studies have shown that self-assessment skills can be improved upon by actively eliciting feedback from others and benchmarking of performance (Eva & Regehr, 2005; Davis et al., 2006). There are also suggestions that combining self-assessment and student ratings can provide useful feedback to clinical teachers provided that the aim of self-assessment is to stimulate workplace learning by identifying standards of excellence, deficits, and suggestions for improvement (Ross & Bruce, 2007; Stalmeijer et al., 2010). Although this study did not set out to examine the residents' ability to self-assess their competence in facilitating teaching and learning in clinical setting, the discrepancies in the self-perceived and true learning needs of residents suggest that our residents may likely require to be taught how to improve on their self-assessment proficiency. This is important for lifelong self-directed learning.

Residents ranked communication skills, leadership skills, teaching procedural skills, bedside teaching, and evidence-based medicine as their perceived important topics to be included in a RaT programme. This ranking of topics differs from the report by Sanchez-Mendiola et al. (2010) in which teaching of psychomotor skills, diagnostic reasoning, diagnostic tests, evidence-based medicine and how to give lectures were ranked as the leading five topics to be included in a RaT educational intervention. The reasons for these differences in ranking of topics may be due to the fact that the topics picked by our residents feature strongly in their various postgraduate examinations. However, the reasons for the residents' choices were not investigated in this study.

Residents ranked interactive sessions with teachers and working in small groups with a facilitator above online modes of teaching as the preferred method of delivery of a RaT. This finding is similar to report by Sanchez-Mendiola et al. (2010) who documented interactive lectures with professors, and working in small groups with facilitators as the preferred teaching methods for a RaT educational programme in a needs assessment study in Mexico. In another needs assessment study, D'Silva and colleagues (2016) also documented that residents preferred to learn about teaching through mentorship pairing, workshops led by experts, and small group interactive discussions. The poor information technology facilities in our context

probably influenced the relegation of online modes of teaching as the preferred method of delivery of a possible educational intervention.

Unlike many postgraduate training programmes in which the residents' teaching role is not explicitly stated (Ramani et al., 2016), residents in Nigeria are expected to provide formal teaching to medical students during their clinical rotations and they have a teaching allowance incorporated into their monthly allowance. However, not all residents are aware of their teaching role because only thirty-four (87%) residents indicated that clinical bedside teaching was part of their schedule. This unawareness may be due to the fact that residents do not always have time specifically dedicated to engage the students on clinical teachings. Similar to report by D'Silva et al. (2016), all residents indicated their desire to be trained in developing their teaching skills.

Residents spent an average of 5 hours (range 2-21) per week in teaching medical students, and junior residents indicated they spent more hours teaching undergraduate medical students than senior residents. This finding is likely due to the fact that junior residents have more contact with students being the first-on-call during the official duty hours. Also, junior residents being closer in training to medical students are probably more strategically placed to be involved in their training (Ricciotti et al., 2012).

Two-thirds of the residents who took part in this study have never had any formal training in teaching. This finding is similar to reports from other settings. D'Silva et al. (2016) reported that 53% of Geriatric residents in Canada had had no formal training in clinical teaching; Wachtel and colleagues (2013) reported that 59% of Emergency Medicine residents had no formal training in teaching. None of the 25 residents at the Faculty of Health Sciences, University of Pretoria, South Africa in a study by du Toit-Prinsloo et al. (2016), and none of the 51 residents at the teaching hospital of University of Maastricht, Netherlands (Busari et al., 2000) had received formal training in teaching.

The percentage of our residents who had had formal training in teaching (33.3%) was similar to the 30% reported by Wachtel et al. (2013). Similar to the report by Wachtel et al. (2013), multiple methods were used for those who indicated they had had formal training in teaching. In this study, the most commonly used method employed to train participants who had had some form of formal training in teaching is lectures. This is similar to the report by Wachtel et al. (2013). Other methods used were seminars, videos, handouts, and direct observations of teaching sessions.

Residents in this study ranked undergraduate medical students as the group they spent most time teaching. This finding differs from the National Autonomous University of Mexico where medical students were ranked third as the group residents spent most time teaching. In that report, other residents, interns and nurses were ranked first, second and fourth respectively.

The average duration of the observed teaching encounters was 61 minutes (range 40 – 100 minutes). While 11 (55%) residents were able to keep within the pre-encounter agreed duration of 40-60 minutes, 9 (45%) residents taught beyond 60 minutes. However, I made no attempt to stop any of the teaching sessions. This finding indicates that our residents will need to be trained on time management and efficient pacing of teaching. The average teaching time (61 minutes) was longer than the 27 minutes noted by Katz et al. (2003). The teaching sessions in this study were scheduled and took place in inpatient setting. These reasons explain why the average duration of teaching in our study was longer than that of Katz et al (2003) which took place in a clinic setting with more pressure on time.

Strengths of the study

First, unlike other needs assessment studies that utilized the completion of questionnaires alone (D'Silva et al., 2016; Sanchez-Mendiola et al., 2010), this study combined self-assessment by residents, assessment by students and a budding education expert following direct observation of clinical bedside teaching sessions. This triangulation of assessments from multiple sources helps in getting a better view of our residents perceived and true learning needs for facilitating teaching and learning in the clinical setting. Second, determination of the true learning needs of our residents for facilitating teaching and learning in the clinical setting occurred following observation of teaching in a real-life 'authentic' clinical setting. Third, the MCTQ instrument used for this study has the sound underpinning of a theoretical framework in workplace learning *(cognitive apprenticeship)*. This makes it suitable for use in different disciplines.

Limitations of the study

The residents, students and the researcher are from one institutions and findings from this study may not be generalizable to other institutions within or outside Nigeria. The small number of residents at our institution, and the non-participation of few residents may affect the conclusions that can be drawn from this study. Our residents may vary in their ability to self-assess their ability to facilitate teaching and learning in the clinical setting (Ward et al., 2002). Consequently, our results apply to the group of residents and not to individual residents.

However, our aim was to determine the perceived and true learning needs of our residents as a group in facilitating teaching and learning in the clinical setting.

There is a suggestion that the different items of the MCTQ instrument may not be properly evaluated after a short rotation or teaching session (Boerboom et al., 2010; Stalmeijer et al., 2009). There is a possibility that our students probably fell back on their experience and relationships with these residents before the teaching session in rating the residents. Studies on self-assessment have raised the possibility that people may not have the same understanding of same aspects of performance and as such may not rate the same aspects of their performance in a consistent manner (Ward et al., 2002). This and other themes may not be captured by this quantitative study and will require a qualitative study to further explore the learning needs of our residents.

Lastly, there is a likelihood that our residents may have displayed an upbeat approach to their teaching performance since they were aware that the teaching session was being observed, the so-called *'observer effect'*. Observer effect refers to the change in behaviour or performance as a result of the individual's awareness of being observed (Holden, 2001; Oswald et al., 2014). However, the residents were blinded to the items of the MCTQ instrument before the commencement of the teaching session, and this may have reduced the observer effect. Also, I attended many teaching sessions by residents for periods that varied from 10-15 minutes before the actual commencement of the study to create the envisaged atmosphere for the study. In addition, I remained passive and non-judgemental throughout the entire period of observation. These measures likely helped in mitigating against the observer effect. However, one could argue that if the residents were able to display the teaching skill, they do not need to be taught it, only maybe encouraged to use it.

A thorough literature search of several national and international data bases for RaT programmes did not yield any article from Nigeria on needs assessment of residents' teaching skills in clinical settings. Findings from this study therefore provide important baseline information on the strengths and weaknesses of our residents in facilitating learning in the clinical setting. Residents' role in undergraduate medical training is pivotal in many institutions globally, and particularly in Nigeria taking into consideration the current emigration of a large number of consultants (who also serve as lecturers in universities) to high-income countries for better working conditions. Our residents thus represent an under-tapped, under-trained, and under-utilized pool of educational manpower. Successful planning and implementation of a

RaT programme following this needs assessment will ensure a seamless transition of our residents into consultants with the necessary content and teaching skills to function as university lecturers.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Residents play a critical role in the training of undergraduate medical students by teaching history taking, physical examination techniques, procedures, and clinical reasoning. Medical students also tacitly learn the informal curriculum of attitude, work ethics and role modelling by observing residents during their interactions with patients, care givers and other health care

workers. Despite this pivotal role of residents in undergraduate medical training, many of them have not been formally trained to teach.

This study identified the learning needs of residents in facilitating learning in an authentic clinical setting by obtaining data from relevant important stakeholders i.e. residents, undergraduate medical students and a budding health professions educator. This triangulation provided a reliable, comprehensive and complimentary view of residents' strengths and weaknesses in facilitating learning. The learning needs identified were:

(1) the gradual reduction of guidance given to medical students in order to allow students' autonomy during interaction,
(2) the formulation of learning goals,
(3) the explicit demonstration of different components of the interactions (i.e. history taking, physical examination and clinical reasoning) to students in order for students to have a conceptual model of the cognitive processes involved in achieving the task at hand (modelling),
(4) the stimulation of students to reflect on their strengths and weaknesses in order to improve on their performances,
(5) the encouragement to students to pursue self-directed learning,
(6) the observation of students during clinical practice in order identify the deficiencies in the students' clinical skills, and
(7) the provision of constructive feedback, and insights into students' performance that need to be improved.

This study also provided the opportunity to identify our residents' strengths in facilitating learning in the clinical setting. Our residents displayed a strong ability in providing a safe, non-threatening, respectful and friendly learning environment to medical students during clinical teaching. Residents also frequently asked students to explain their rationale and reasoning during the teaching-learning encounters, and provided the students with opportunities to ask them questions. These good teaching practices must be fostered in our residents.

Perceived important topics to be included in a RaT programme from the residents' perspective are communication skills, leadership skills, teaching procedural skills, bedside teaching, and evidence-based medicine. The preferred method of delivery of a RaT programme according to the residents are interactive sessions with teachers and working in small groups with a facilitator.

For an educational intervention programme such as RaT to be effective, it must be tailored to meet the learning needs of the residents, both in terms of the content of the curriculum and the most effective ways of delivering the content. The perceived and true learning needs of our residents obtained from this study will be shared with all stakeholders in our establishment in order to convince them of the need to develop a RaT programme at the institution. The findings of this study will be used in designing a curriculum for the RaT programme and will emphasize the needed teaching behaviours listed under modelling, coaching, scaffolding, reflection and exploration domains of the cognitive apprenticeship model. Residents will also be encouraged to sustain and improve on their ability to create safe, non-threatening, respectful and friendly environment. They should also actively engage the students through questioning to improve the students' understanding. The preferred methods of delivering this curriculum will be the use of interactive sessions with teachers and working in small groups with a facilitator.

Recommendations for further research

In view of the small number of residents, we did not explore the extent to which the students' assessments could have been influenced by residents' characteristics such as gender, year of training, and discipline. This can be explored in another research if there is an increase in the number of residents in the establishment.

This study took place in the inpatient setting of various departments. In view of the fact that the teaching strategies used in engaging students could vary depending on the clinical settings (inpatient, outpatient, theatre), and residents teach in these various settings, assessment of residents' teaching skills in other settings can be looked into.

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APPENDICES

APPENDIX I

RESIDENTS' INFORMATION LEAFLET AND CONSENT FORM

TITLE OF THE RESEARCH PROJECT: Residents–as–Teachers: Needs Assessment of resident teaching skills in clinical settings using direct observation of teaching

REFERENCE NUMBER: 7467

PRINCIPAL INVESTIGATOR: Dr Olugbenga Edward AYODELE

SUPERVISOR: Prof Julia BLITZ

ADDRESS: Centre for Health Professions Education, Stellenbosch University, Tygerberg, South Africa; and Department of Internal Medicine, Faculty of Clinical Sciences, College of Health Sciences, Ladoke Akintola University of Technology, Ogbomoso, PMB 4000, Ogbomoso, Oyo State, Nigeria.

CONTACT NUMBER: +2347038684082

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point.

This study has been approved by the **Health Research Ethics Committee at Stellenbosch University** and will be conducted according to the Ethical Guidelines and Principles of the International Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is this research study all about?

It is a well – known fact that residents play a significant role in the training of undergraduate medical students. Residents teach undergraduate students in Outpatient Clinics, ward rounds, Accidents and Emergency units, Theatres, Labour Room etc. However, despite this important role, many of them have not been formally trained to teach and may be adopting ineffective teaching strategies.

Effective teaching and learning involves knowledge of the subject matter and transfer and reception of this knowledge (information) by the students (learners). Studies have shown that formal training of residents on teaching and learning enhances their teaching ability. However, in order to design a programme for this formal training in teaching and learning, it is important that strengths and gaps in the current teaching practices of the residents are identified (needs assessment). As a resident, you will be required to complete a self-administered questionnaire and the Maastricht Clinical Teaching Questionnaire (MCTQ) to assess your self – perceived learning needs with regards to clinical teachings. Also, one of your clinical teaching sessions will be directly observed by undergraduate medical students and the Principal Investigator,

who will then complete the Maastricht Clinical Teaching Questionnaire in order to determine your true/observed learning needs in facilitating clinical teachings.

Data collection period

The data collection period for the study will be between September and October, 2018.

Why have you been invited to participate?

As a resident and a major stakeholder, it is believed that your participation in the study will help in determining the perceived and true needs of residents with regards to facilitation of teaching and learning before considering establishing residents–as–teachers programme in the institution.

What will your responsibilities be?

It will be required of you to give consent to be part of the study and to complete a self – administered questionnaire and the Maastricht Clinical Teaching Questionnaire (MCTQ) assessment tool as a resident. The completion of the self–administered questionnaire and the Maastricht Clinical Teaching Questionnaire (MCTQ) will take 15 – 20 minutes. Also, you are required to give consent for direct observation of one of your clinical teaching sessions by the Principal Investigator (Dr Olugbenga E. Ayodele) who will thereafter complete the same MCTQ instrument.

What will you benefit from taking part in this research?

It is envisaged that the formal institution of a RaT programme following a proper needs assessment will ensure the development of suitable RaT curricular objectives that are: consistent with institutional goals, relevant to the local setting, appropriate to the residents' learning needs, and can be accommodated by institutional budget and resources. Such RaT programme will help in improving the facilitation of teaching and learning of medical students by residents and the residents' professional development. It may also encourage residents to pursue an academic career in the future.

Are there any risk involved in taking part in this research?

Data collection sheet will not bear your name and the information supplied cannot be linked to you. Also, all data reporting will be anonymised. This is to minimize any perceived risk by you as a participant. Also, non–participation in the study will not influence academic evaluation whatsoever.

If you do not agree to take part, what alternatives do you have?

Your participation is **entirely voluntary** and you are free to decline to participate.

Will you be paid to take part in this study and are there any costs involved?

No, you will not be paid to take part in the study. All cost involved in the study will be borne by the Principal Investigator (Dr Olugbenga E. Ayodele)

Is there anything else that you should know or do?

You can contact Dr Olugbenga E. Ayodele at Tel. +2347038684082 if you have any further queries or encounter any problems.

You can contact the Health Research Ethics Committee at +21-938 9207 if you have any concerns or complaints that have not been adequately addressed by the Principal Investigator.

You will receive a copy of this information and consent form for your own records.

DECLARATION BY PARTICIPANT

By signing below, I ……..……. agree to take part in a research study entitled 'Residents – as – Teachers: Needs Assessment of resident teaching skills in clinical settings using direct observation of teaching'.

I declare that:

I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.

I have had a chance to ask questions and all my questions have been adequately answered.

I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.

I may choose to leave the study at any time and will not be penalised or prejudiced in any way.

I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) .....…..……. on (*date*) ……...…….. 2018.

....

Signature of participant **Signature of witness**

Declaration by investigator

I *(name)* ……..…… declare that:

□ I explained the information in this document to ……..

□ I encouraged him/her to ask questions and took adequate time to answer them.

□ I am satisfied that he/she adequately understands all aspects of the research, as discussed above

□ I did/did not use an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*

Signed at (*place*) .....…..……. on (*date*) ……...…….. 2018.

....

Signature of investigator **Signature of witness**

APPENDIX II

STUDENTS' INFORMATION LEAFLET AND CONSENT FORM

TITLE OF THE RESEARCH PROJECT: Residents – as – Teachers: Needs Assessment of resident teaching skills in clinical settings using direct observation of teaching

REFERENCE NUMBER: 7467

PRINCIPAL INVESTIGATOR: Dr Olugbenga Edward AYODELE

SUPERVISOR: Prof Julia BLITZ

ADDRESS: Centre for Health Professions Education, Stellenbosch University, Tygerberg, South Africa; and Department of Internal Medicine, Faculty of Clinical Sciences, College of Health Sciences, Ladoke Akintola University of Technology, Ogbomoso, PMB 4000, Ogbomoso, Oyo State, Nigeria.

CONTACT NUMBER: +2347038684082

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point.

This study has been approved by the **Health Research Ethics Committee at Stellenbosch University** and will be conducted according to the Ethical Guidelines and Principles of the International Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is this research study all about?

It is a well – known fact that residents play a significant role in the training of undergraduate medical students. Residents teach undergraduate students in Outpatient Clinics, ward rounds, Accidents and Emergency units, Theatres, Labour Room etc. However, despite this important role, many of them have not been formally trained to teach and may be adopting ineffective teaching strategies.

Effective teaching and learning involves knowledge of the subject matter and transfer and reception of this knowledge (information) by the students (learners). Studies have shown that formal training of residents on teaching and learning enhances their teaching ability. However, in order to design a program for this formal training in teaching and learning, it is important that strengths and gaps in the current teaching practices of the residents are identified (needs assessment). As a student, you will be required to complete the Maastricht Clinical Teaching Questionnaire (MCTQ) after a clinical teaching session teaching by a resident doctor to assess the true/observed learning needs of residents with regards to clinical teachings. The Principal

Investigator, will also complete the Maastricht Clinical Teaching Questionnaire in order to determine the true/observed learning needs of residents in facilitating clinical teachings.

Data collection period

The data collection period for the study will be between September and October, 2018.

Why have you been invited to participate?

As a student and a major stakeholder, it is believed that your participation in the study will help in determining the perceived and true needs of residents with regards to facilitation of teaching and learning before considering establishing residents – as – teachers programme in the institution.

What will your responsibilities be?

It will be required of you to give consent to be part of the study and to complete the Maastricht Clinical Teaching Questionnaire (MCTQ) assessment tool immediately after being part of a structured clinical teaching by a resident. The completion of the MCTQ will take 10 – 15 minutes.

What will you benefit from taking part in this research?

It is envisaged that the formal institution of a RaT programme following a proper needs assessment will help in improving the facilitation of teaching and learning of medical students by residents. In addition, it will help in ensuring curricular objectives that are: consistent with institutional goals, relevant to the local setting, appropriate to the residents' learning needs, and implementable within institutional budget and resources.

Are there any risk involved in taking part in this research?

Data collection sheet will not bear your name and the information supplied cannot be linked to you. Also, all data reporting will be anonymised. This is to minimize any perceived risk by you as a participant.

If you do not agree to take part, what alternatives do you have?

Your participation is **entirely voluntary** and you are free to decline to participate. Also, non – participation in the study will not influence academic evaluation whatsoever.

Will you be paid to take part in this study and are there any costs involved?

No, you will not be paid to take part in the study. All cost involved in the study will be borne by the Principal Investigator (Dr Olugbenga E. Ayodele)

Is there anything else that you should know or do?

You can contact Dr Olugbenga E. Ayodele at Tel. +2347038684082 if you have any further queries or encounter any problems.

You can contact the Health Research Ethics Committee at +21-938 9207 if you have any concerns or complaints that have not been adequately addressed by your study doctor.

You will receive a copy of this information and consent form for your own records.

DECLARATION BY PARTICIPANT

By signing below, I ……..……. agree to take part in a research study entitled 'Residents – as – Teachers: Needs Assessment of resident teaching skills in clinical settings using direct observation of teaching'.

I declare that:

I have read this information and consent form and it is written in a language with which I am fluent and comfortable.

I have had a chance to ask questions and all my questions have been adequately answered.

I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.

I may choose to leave the study at any time and will not be penalised or prejudiced in any way.

I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) .....…..…….. on (*date*) ……...…….. 2018.

....

Signature of participant **Signature of witness**

Declaration by investigator

I *(name)* ……..…… declare that:
 I explained the information in this document to ……..

 I encouraged him/her to ask questions and took adequate time to answer them.

 I am satisfied that he/she adequately understands all aspects of the research, as discussed above

 I did/did not use an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*

Signed at (*place*) .....…..…….. on (*date*) ……...…….. 2018.
....

Signature of investigator **Signature of witness**

APPENDIX III PART A

RESIDENT'S DATA COLLECTION INSTRUMENT

PART A – QUESTIONNAIRE TO BE COMPLETED BY RESIDENTS

Date:

Study ID number

1. Year of Training
   a. When did you commence residency training? ☐

2. What is your current status (please tick)?
   Junior Resident ☐ Senior Resident ☐

3. Are you involved in clinical teaching such as bedside ward teaching, teaching in clinic, or theatre (please tick)? Yes ☐ No ☐

4. If the response to the preceding question is yes, rank from 1 to 4 the group/cadre whom you teach, where 1 is the group you spent more time teaching, and 4 less time teaching.

   a. Nursing students ☐

   b. Undergraduate medical students ☐

   c. Interns ☐

   d. Residents ☐

5. Is the clinical teaching planned as part of your schedule (please tick)? Yes ☐ No ☐

6. On the average, how many hours a week do you teach undergraduate medical students on the wards, clinics, emergency room or theatre? ☐ Hours

7. How would you rate your competency to teach undergraduate medical students (please tick)?

   Not competent ☐ Somewhat competent ☐ Fully competent ☐

8. Have you received any training in how to teach at any point or since you started residency (please tick)? Yes ☐ No ☐

9. If the answer to question 8 above is Yes, which of the method(s) was (were) used in the training (please tick)?

   a. Lecture ☐

   b. Workshop ☐

   c. Seminars ☐

   d. Video ☐

   e. Handout ☐

   f. Others (Specify) ☐

10. How important do you think it is to develop your teaching skill (please tick)?
    Not important ☐ Somewhat important ☐ Very important ☐

11. Would you like to be trained in developing your teaching skills (please tick)?
    Yes ☐ No ☐

12. If a teaching skills programme is implemented during your residency training, which of the following topics would you regard as important to you in developing your teaching skills? (Rank the topics from 1 to 19 where 1 is the most important and 19 is the least important).

    a. Leadership ----------
    b. Learning theories ----------
    c. Learning styles ----------
    d. Communication skills----------
    e. Giving feedback----------
    f. Role modelling ----------
    g. Assessment methods----------
    h. Ethics----------
    i. Time management----------
    j. History and physical examination----------
    k. Clinical (diagnostic) reasoning----------
    l. Teaching of procedural skills----------
    m. Conflict management ----------
    n. Bedside teaching----------
    o. Evidence- based medicine----------
    p. Reflective practice----------
    q. Motivational strategies----------
    r. Burnout syndrome----------

    s. Others (Specify)----------

13. Rank the teaching methodologies you would prefer to be used for you as a resident in a teaching skill programme (1 for the most preferred method and 5 for the least preferred method).
    a. Interactive sessions with teachers----------

b. Work in a small group with a facilitator ----------

c. Printed readings for self-study and programmed assignments----------

d. Didactic material in a web site for online individual learning----------

e. Online work in small group----------

14. What is your sex (please tick)? Male Female

15. What is your age last birthday? Years

APPENDIX III - PART B

MCTQ RESIDENTS' VERSION

		Fully disagree 1	Disagree 2	Neutral 3	Agree 4	Fully agree 5	Unable to comment
	MODELLING						
	As a clinical teacher						
1	I demonstrated how different tasks should be performed.						
2	I explained, while performing a task, which aspects were important and why.						
3	I created sufficient opportunities for the students to observe me						
4	I was a role model for the medical students						

	Overall ratings on modelling						
	COACHING						
	As a clinical teacher						
5	The students observed me while I was performing a task.						
6	I provided the students with constructive and concrete feedback during or following direct observation.						
7	I gave the student(s) a better insight into aspects of his/her/their performance that needed improvement.						
	Overall ratings on coaching						
	SCAFFOLDING						
	As a clinical teacher						
8	I adjusted my teaching activities to the student's (students') level of experience and competence.						
9	I allowed the student(s) to perform tasks that fit his/her/their level of experience and competence.						
10	I was supportive to the student(s) when he/she/they experienced difficulties with a task.						
11	I gradually decreased the amount of guidance in order to bolster the Student's (students') independence.						
	Overall ratings on scaffolding						
	ARTICULATION						
	As a clinical teacher						
12	I asked the student(s) to explain his/her/their reasoning and arguments.						
13	I alerted the student(s) to gaps in his/her/their knowledge and skills.						
14	I asked questions to increase the student(s) understanding.						
15	I stimulated the student(s) to ask questions to increase his/her/their understanding.						
	Overall ratings on articulation						
	REFLECTION						
	The clinical teacher:						
16	I stimulated the student(s) to think about his/her/their own strengths and weaknesses.						
17	I stimulated the student(s) to think about how to improve his/her/their own strengths and weaknesses.						
	Overall ratings on reflection						
		Fully disagree 1	Disagree 2	Neutral 3	Agree 4	Fully agree 5	Unable to comment
	EXPLORATION						
	As a clinical teacher						
18	I stimulated the student(s) to formulate his/her/their own goals						
19	I stimulated the student(s) to achieve his/her/their own goals						
20	I challenged the student(s) to explore new tasks and possibilities.						
	Overall ratings on exploration						
	General Learning Climate						
	As a clinical teacher						
21	I established a safe-learning environment.						
22	I showed an interest in the student(s).						

23	I treated the student(s) with respect.						
24	I took enough time to supervise the students.						
	Overall ratings on general learning climate.						
	Overall rating of the teacher on a scale of 1-10						

*A safe learning environment refers to the ambience of the teaching interaction and is characterized by the learners' comfort and stimulation. Indications of this include: encouragement of learners to participate actively in the discussion; encouragement of learners to admit their limitations; avoidance of frequent interruptions; and allowing learners to feel comfortable asking questions.

APPENDIX IV

STUDENTS' DATA COLLECTION FORM

Study ID No:

Year of Study:

Current Clinical Posting:

Gender:

Age:

STUDENT VERSION MCTQ

Using the following scale, please rate each item under each category by ticking one number

1= Fully disagree; 2= Disagree; 3= Neutral; 4 =Agree; 5 = Fully agree; Unable to comment if not applicable

		Fully disagree 1	Disagree 2	Neutral 3	Agree 4	Fully agree 5	Unable to comment
	MODELLING						
	The clinical teacher:						
1	Demonstrated how different tasks should be performed.						
2	Explained, while performing a task, which aspects were important and why.						
3	Created sufficient opportunities for me to observe him or her.						
4	Was a role model for me.						
	Overall ratings on modelling						
	COACHING						
	The clinical teacher:						
5	Observed me while I was performing a task.						
6	Provided me with constructive and concrete feedback during or following direct observation.						
7	Gave me a better insight into aspects of my performance that needed improvement.						
	Overall ratings on coaching						
	SCAFFOLDING						
	The clinical teacher:						
8	Adjusted his/her teaching activities to my level of experience and competence.						
9	Allowed me to perform tasks that fit my level of experience and competence.						
10	Was supportive when I experienced difficulties with a task.						
11	Gradually decreased the amount of guidance in order to bolster my independence.						
	Overall ratings on scaffolding						
		Fully disagree 1	Disagree 2	Neutral 3	Agree 4	Fully agree 5	Unable to comment
	ARTICULATION						
	The clinical teacher:						
12	Asked me to explain my reasoning and arguments.						
13	Alerted me to gaps in my knowledge and skills.						
14	Asked questions to increase my understanding.						
15	Stimulated me to ask questions to increase my understanding.						
	Overall ratings on articulation						
	REFLECTION						

	The clinical teacher:						
16	Stimulated me to think about my own strength and weaknesses.						
17	Stimulated me to think about how to improve my own strengths and weaknesses.						
	Overall ratings on reflection						
	EXPLORATION						
	The clinical teacher:						
18	Stimulated me to formulate my own goals						
19	Stimulated me to achieve my own goals						
20	Challenged me to explore new tasks and possibilities.						
	Overall ratings on exploration						
	GENERAL LEARNING CLIMATE						
	The clinical teacher:						
21	Established a safe-learning environment.						
22	Showed an interest in me as a student.						
23	Treated me with respect.						
24	Took enough time to supervise me.						
	Overall ratings on general learning climate.						
	Overall rating of the teacher on a scale of 1-10						

*A safe learning environment refers to the ambience of the teaching interaction and is characterized by the learners' comfort and stimulation. Indications of this include: encouragement of learners to participate actively in the discussion; encouragement of learners to admit their limitations; avoidance of frequent interruptions; and allowing learners to feel comfortable asking questions.

APPENDIX V

OBSERVER VERSION MCTQ

Study ID No:

Gender of resident:

Date:

Day of the week:

Clinical Setting:

Number of students:

Time session commences:

Time session ends:

		Fully disagree 1	Disagree 2	Neutral 3	Agree 4	Fully agree 5	Unable to comment
	MODELLING						
	The clinical teacher:						
1	Demonstrated how different tasks should be performed.						
2	Explained, while performing a task, which aspects were important and why.						
3	Created sufficient opportunities for student(s) to observe him or her.						
4	Was a role model for student(s)						
	Overall ratings on modelling						
	COACHING						
	The clinical teacher:						
5	Observed the student(s) while s/he (they) was (were) performing a task.						
6	Provided the student(s) with constructive and concrete feedback during or following direct observation.						
7	Gave the student(s) a better insight into aspects of his/her (their) performance that needed improvement.						
	Overall ratings on coaching						
	SCAFFOLDING						
	The clinical teacher:						
8	Adjusted his/her teaching activities to student's (students') level of experience and competence.						
9	Allowed the student(s) to perform tasks that fit his/her (their) level of experience and competence.						
10	Was supportive when the student(s) experienced difficulties with a task.						
11	Gradually decreased the amount of guidance in order to bolster the student's (students') independence.						
	Overall ratings on scaffolding						
	ARTICULATION						
	The clinical teacher:						
12	Asked the student(s) to explain his/her reasoning and arguments.						
13	Alerted the student(s) to gaps in his/her/their knowledge and skills.						
14	Asked questions to increase student's (students') understanding.						
15	Stimulated the student(s) to ask questions to increase his/her (their) understanding.						
	Overall ratings on articulation						
	REFLECTION						
	The clinical teacher:						

16	Stimulated the student(s) to think about his/her (their) own strengths and weaknesses.						
17	Stimulated the student(s) to think about how to improve his/her (their) own strengths and weaknesses.						
	Overall ratings on reflection						
	EXPLORATION						
	The clinical teacher:						
18	Stimulated the student(s) to formulate his/her (their) own goals						
19	Stimulated the student(s) to achieve his/her (their) own goals						
20	Challenged the students to explore new tasks and possibilities.						
	Overall ratings on exploration						
	GENERAL LEARNING CLIMATE						
	The clinical teacher:						
21	*Established a safe-learning environment.						
22	Showed an interest in the student s).						
23	Treated the student(s) with respect.						
24	Took enough time to supervise the student(s).						
	Overall ratings on general learning climate.						
	Overall rating of the teacher on a scale of 1-10						

*A safe learning environment refers to the ambience of the teaching interaction and is characterized by the learners' comfort and stimulation. Indications of this include: encouragement of learners to participate actively in the discussion; encouragement of learners to admit their limitations; avoidance of frequent interruptions; and allowing learners to feel comfortable asking questions.

APPENDIX VI

Health Research Ethics Committee (HREC)

Approval Notice

New Application

10/10/2018

Project ID :7467

HREC Reference # S18/06/121

Title: RESIDENTS – AS – TEACHERS: NEEDS ASSESSMENT OF RESIDENT TEACHING SKILLS IN CLINICAL SETTINGS USING DIRECT OBSERVATION OF TEACHING

Dear Dr Olugbenga Ayodele

The **Response to Modifications** received on 13/09/2018 17:35 was reviewed by members of **Health Research Ethics Committee** via **expedited** review procedures on 10/10/2018 and was approved.

Please note the following information about your approved research protocol:

Protocol Approval Period: **10 October 2018 - 9 October 2019**

Please remember to use your project ID (7467) and HREC reference number S18/06/121 on any documents or correspondence with the HREC concerning your research protocol.

Please note that the HREC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review

Translation of the informed consent document(s) to the language(s) applicable to your study participants should now be submitted to the HREC.

Please note you can submit your progress report through the online ethics application process, available at: Links Application Form Direct

Link and the application should be submitted to the HREC before the year has expired. Please see *Forms and Instructions* on our HREC website (www.sun.ac.za/healthresearchethics) for guidance on how to submit a progress report.

The HREC will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly for an external audit.

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility, permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Please consult the Western Cape Government website for access to the online Health Research Approval Process, see: https://www.westerncape.gov.za/general-publication/health-research-approval-process. Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.

For standard HREC forms and instructions, please visit: Forms and Instructions on our HREC website
https://applyethics.sun.ac.za/ProjectView/Index/7467

If you have any questions or need further assistance, please contact the HREC office at 021 938 9677.

Yours sincerely,

Mrs. Ashleen Fortuin

Health Research Ethics Committee 1 (HREC1)

National Health Research Ethics Council (NHREC) Registration Number:

REC-130408-012 (HREC1)□REC-230208-010 (HREC2)

ETHICAL COMMITTEE

LADOKE AKINTOLA UNIVERSITY OF TECHNOLOGY TEACHING HOSPITAL

OGBOMOSO, OYO STATE, NIGERIA

Address: P.M.B 1001, Ogbomoso Phone: 08034760156, 08033185304 E-Mail: ethicalreview@yahoo.com

Our Ref: LTH/OGB/EC/2018/180 Your Ref: _____ Date: 12TH OCTOBER, 2018

CLEARANCE CERTIFICATE

PROTOCOL NUMBER:	LTH/OGB/EC/2018/180
PROJECT TITLE:	*Residents-as-Teachers: Needs Assessment of Resident Teaching Skills in Clinical setting using Direct Observation of Teaching.*
INVESTIGATOR:	Prof. Olugbenga Edward Ayodele (MB; BS (Ib): FWACP).
DEPARTMENT/ INSTITUTION:	Department of Internal Medicine, LAUTECH Teaching Ogbomoso, Oyo State.
DATE OF SUBMITION OF PROTOCOL:	27TH JUNE, 2018
DATE CONSIDERED:	12TH OCTOBER, 2018
DECISION OF THE COMMITTEE:	APPROVED
CHAIRMAN:	Dr. Olakulehin O. A.
SIGNATURE AND DATE:	12/10/18

ETHICAL REVIEW COMMITTEE
Lautech Teaching Hospital
Ogbomoso

Cc: Supervisors:

NOTE: THE COMMITTEE IS EXEMPTED FROM LIABILITY OF THE PROPOSAL AND THIS CERTIFICATE WILL BE REVOKED IF PROTOCOLS STATED IN THE PROPOSAL IS DEVIATED FROM.

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DECLARATION BY INVESTIGATOR(S)

PROTOCOL NUMBER (Please quote in all enquiries): **LTH/OGB/EC/2018/180**

To be completed in four and three copies returned to the Secretary, Ethical Review Committee, Ladoke Akintola University of Technology Teaching Hospital, Ogbomoso Oyo State, Nigeria.

I /We fully understand the conditions under which I am/we are authorized to conduct the above mentioned research and I/We will ensure compliance with these conditions. Should any departure be contemplated from the research procedure as approved, I/We undertake to resubmit the protocol to the Ethical Review Committee.

Signature..... Date....15/10/18.....